





22101798328

CONTRIBUTIONS
TO
PATHOLOGY
AND THE
PRACTICE OF MEDICINE.

*Presented to the Library
by Mrs Wardell*

CONTRIBUTIONS
TO
PATHOLOGY
AND THE
PRACTICE OF MEDICINE.

BY
JOHN RICHARD WARDELL, M.D. EDIN.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS;
FELLOW OF THE ROYAL MEDICAL AND CHIRURGICAL SOCIETY;
AND MEMBER OF THE PATHOLOGICAL SOCIETY, LONDON.
FORMERLY ASSISTANT PATHOLOGICAL ANATOMIST TO THE ROYAL INFIRMARY;
PRESIDENT OF THE ROYAL PHYSICAL AND HUNTERIAN MEDICAL SOCIETIES,
EDINBURGH;
AND CONSULTING PHYSICIAN TO THE GENERAL HOSPITAL,
TUNBRIDGE WELLS.



LONDON
H. K. LEWIS, 136 GOWER STREET, W.C.
1885.

2143 07-10-4

M16787

WELLCOME INSTITUTE LIBRARY	
Coll.	wel'comec
Call	
No.	WB100
	1885
	W26c

TO

SIR WILLIAM JENNER, BART., K.C.B.,

M.D. LOND., D.C.L. OXON., LL.D. CAMB. AND EDIN., F.R.S. ;
PRESIDENT OF THE ROYAL COLLEGE OF PHYSICIANS OF LONDON ;
PHYSICIAN IN ORDINARY TO HER MAJESTY THE QUEEN AND TO HIS ROYAL
HIGHNESS THE PRINCE OF WALES ;

AND TO

RICHARD QUAIN, M.D., F.R.S.,

FELLOW AND LATE SENIOR CENSOR OF THE ROYAL COLLEGE OF PHYSICIANS ;
MEMBER OF THE SENATE OF THE UNIVERSITY OF LONDON ;
MEMBER OF THE GENERAL COUNCIL OF MEDICAL EDUCATION AND REGISTRATION ;
CONSULTING PHYSICIAN TO THE HOSPITAL FOR CONSUMPTION AND
DISEASES OF THE CHEST AT BROMPTON, ETC.,

THIS WORK IS DEDICATED, BY THE AUTHOR.

TO EACH

IN REMEMBRANCE OF LONG-FORMED FRIENDSHIP ;

AND TO BOTH

IN GRATEFUL ACKNOWLEDGMENT OF MANY ACTS OF KINDNESS.





Digitized by the Internet Archive
in 2014

<https://archive.org/details/b20393325>

PREFACE.

SOME of my friends, whose names are well known, and who are regarded as being amongst the leading members of the profession, having urgently advised the collection and publication of my medical writings in a separate volume, I have at length complied with their kind and complimentary recommendation. The great majority of the articles from time to time appeared in certain of the periodicals. They have not been arranged with any reference to nosological classification; nor has it been deemed necessary to place them according to the dates at which they were written. I have been induced to incorporate in the book the lengthy description of Relapsing Fever which was published many years ago, mainly through a remembrance of the value which my friend the late Dr. Murchison put upon the facts and statistics there given, and who said all subsequent writers on that form of fever "have from it borrowed largely;" from a consideration that careful and copious notes were taken personally, at the bedside of nearly Twelve Hundred cases; and that the account of the marked characteristics of that now acknowledged specifically distinct

affection still holds good. The whole of the maladies treated upon in this work being such examples of diseases as are commonly observed, it is hoped the articles will be of some use to the practitioner, and also to writers, when reference is wished to be made relative to the respective complaints which are the subjects in the following pages.

J. R. W.

July 1st, 1885.

CONTENTS.

	PAGE
I. HYPERTROPHY OF THE HEART	1
II. DISEASES OF THE SPLEEN	27
III. DISEASES OF THE PANCREAS	108
IV. ENTERALGIA	124
V. PERITONITIS	133
VI. ENTERITIS	175
VII. ULCERATION OF THE BOWELS	209
VIII. CARCINOMA OF THE BOWELS	223
IX. FATAL OBSTRUCTION OF THE BOWELS CAUSED BY A BAND OF LYMPH	233
X. ACUTE PERITONITIS AND DISPLACEMENT OF THE CÆCUM	235
XI. PELVIC CELLULITIS	238
XII. APOPLEXY	242
XIII. PLEURITIC, SEROUS, AND PURULENT EFFUSIONS . . .	249
XIV. CHRONIC ULCER OF THE STOMACH	322
XV. CARCINOMA OF THE STOMACH	351
XVI. CARCINOMA OF THE LIVER	377
XVII. TYPHOID OR ENTERIC FEVER	394
XVIII. RELAPSING FEVER	419
XIX. SUBCLAVIAN ANEURISM	594
XX. ANEURISM OF THE LEFT VENTRICLE	606
XXI. DIFFUSE ANEURISM OF THE ABDOMINAL AORTA . . .	613
XXII. OBESITY	616
XXIII. HYDRONEPHROSIS	640
XXIV. HÆMATOCELE CONNECTED WITH THE LEFT KIDNEY .	645
XXV. UREMIA	646

XXVI. CHRONIC ULCERATION OF THE URINARY BLADDER, WITH HÆMORRHAGE	651
XXVII. EXFOLIATION OF THE BLADDER	654
XXVIII. SMALL FATTY GROWTHS OBSTRUCTING THE CYSTIC AND COMMON DUCTS	658
XXIX. CHOREA	661
XXX. TUBERCULAR MENINGITIS	667
XXXI. MYELOID SARCOMA TUMOUR OF THE BRAIN	674
XXXII. SYPHILITIC TUMOUR AT THE BASE OF THE BRAIN	677
XXXIII. SYPHILITIC HEMIPLEGIA	680
XXXIV. SCORBUTUS	685
XXXV. ERYTHEMA CIRCINATUM	693
XXXVI. LUPUS ERYTHEMATOSUS TREATED BY LEMON-JUICE	695
XXXVII. PUERPERAL CONVULSIONS	696
XXXVIII. ENLARGEMENT OF THE SPLEEN IN LEUCOCYTHÆMIA	711
XXXIX. SPASMUS GLOTTIDIS	716
XL. CROUP	725
XLI. CHRONIC GLOSSITIS	734
XLII. TÆNIE	740
XLIII. INFANTICIDE	743
XLIV. SUSPECTED POISONING	755
XLV. POISONING BY LAUDANUM	761
XLVI. LEAD PALSY	770
XLVII. POISONING BY SULPHURIC ACID	774
XLVIII. POISONING BY BURNETT'S DISINFECTING FLUID	777
XLIX. A THORN IN THE FLESH	781
L. ADVANCED AND PRESENT MEDICINE	784

CONTRIBUTIONS TO PATHOLOGY

AND THE

PRACTICE OF MEDICINE.

I.

HYPERTROPHY OF THE HEART.

DEFINITION.—Hypertrophy is to be defined as the excessive nutrition of the muscular substance of the heart, which not only becomes augmented, but which as a rule is rendered firmer, denser, and more elastic than natural. In many instances the colour is of deeper and brighter red than is seen in the normal state of the parietes. It does not imply those heterologous changes in which the connective and fatty tissues become excessive, because those may be regarded rather as degenerative formations, whilst true hypertrophy may be looked upon as a conservative alteration in the ventricular walls.

VARIETIES OF HYPERTROPHY.—So far back as two or three centuries ago references were made to enlargement of the heart, originating in excessive action and in mechanical obstruction, but its description received no prominence until Senac published his account of it in 1749. Morgagni, Burserius, Corvisart, and Allan Burns, about the close of the last and at the beginning of the present century, wrote upon this subject. Avenbrugger had long before employed percussion in demonstrating the enlargement of the organ. It was not until 1811, when M. Bertin published his well-known memoirs on this affection, that the varieties of the lesion were accurately described. Previous to that period, the hypertrophous change was imperfectly and ill understood. He showed by microscopical demonstration that there is a relative decrease rather than an increase of fat, and that the true change is absolute increase of the muscular tissue. Since Bertin's time, pathologists in this and other countries have held in the main to the views which he propounded. He contended that hypertrophy may exist not only with, but without, dilatation, and even with a lessened size of the cavity. The three forms which he said occur, and which the majority of writers since his time have acknowledged, are *simple hypertrophy*, in which the

parietes of the compartments have become thickened, the cavities retaining their natural dimensions; *hypertrophy with dilatation*, the cavities being increased in capacity, and their parietes either of natural or augmented thickness; and *hypertrophy with diminished cavities*. These conditions are sometimes mentioned as the *simple*, *excentric*, and *concentric* kinds of hypertrophy. The second change above enumerated corresponds with the *active aneurism* of Corvisart, and the third with the *concentric* of Bertin. In the last now spoken of it has been said that the new material is chiefly added in the interior of the ventricle, thereby encroaching upon the capacity of the cavity. This view, however, has been disputed by most pathologists who have written upon the subject. Cruveilhier in France and Budd in our own country have ascribed the appearance to the contractile energy of the organ suddenly arrested as it were by death. The first named of these authorities had observed in the bodies of those who had suffered by decapitation, or who had died by violent death, the two conditions of great contraction and proportional thickness of the walls of the heart, and he believed that the concentrically hypertrophied hearts of Bertin and Bouillaud were thus to be accounted for in their supposed pathological change. Budd found that such hearts became relaxed by maceration, and regarded the form as mere excess of contraction in the moment of death. Rokitansky and Bamberger acknowledge the rarity of concentric hypertrophy, but are of opinion that it does sometimes occur. It has been said that it has been discovered in the right ventricle in some congenital malformation of the heart. Hypertrophy may obtain in only one compartment, or it may be in two or more. The organ is seldom entirely enlarged. The change is much more common in the ventricles than in the auricles. The left ventricle is more frequently hypertrophied than the right, and the right auricle is more prone to the change than the left. Indeed, the last named compartment is very rarely found with its walls morbidly altered. The most marked amount of thickening is usually about the middle of the ventricles, or where the fleshy columns have their origin; and it may be only towards the base or at the apex, or there may be abnormal thinness of some other part of the ventricular wall; but this appearance is uncommon: when the auricles are hypertrophied there is nearly always more or less of dilatation.

ETIOLOGY AND PATHOLOGY.—*Remote Predisposing Causes*.—A variety of conditions and circumstances might be enumerated as tending to this change of structure. The muscles of this organ, like the muscles of any other part of the body, waste by inactivity, and when the general nutritive functions become lowered and mitigated, as may be observed in phthisis and other forms of exhaustive disease; and, on the other hand, they become enlarged when the quality of the blood is highly nutritive, as seen in the well-fed, the young, the sanguineous, and plethoric. Sex and age have their influence. Males are twice as prone to hypertrophy as females,

because their occupations demand more strength and energy, and the central organs of their circulation have in far greater degree to be subject to protracted efforts, and have to sustain a tax and stress which are rarely demanded in women. In age degenerative changes in an indirect way are apt to throw more work upon the heart. Excess of action in the organ gives rise to an augmented afflux of blood, and increased nutrition is the result. Lessened action carries to it a diminished quantity of blood, when an opposite effect is produced. Ferruginous medicines and rich articles of diet favour hypertrophy. The immoderate use of strong coffee, tea, and vinous and spirituous liquors have been instanced as entering into the causations. Those states of the nervous system in which there is an exalted irritability—an erythism—and when palpitation is readily produced, are followed by this change, whereby the action of the heart becomes accelerated, and, too, when there is no resistance to overcome. When the volume of the blood is augmented, as in general plethora, the vascular system is rendered too full, and excess of work is then imposed upon the heart. Physiology has not yet demonstrated how and whereby it is that the efforts of this organ become so nicely adjusted to the wants of the system when obstacles arise to impede its action, but it would seem that the heart is regulated accordingly, and in exact degree to the demand upon its powers. Impediment to the onward current of the blood, if such become permanent, is of necessity followed by hypertrophy. Narrowing of the outlets and contraction of the great vascular trunks are common causes. The organ under such circumstances is stimulated to continuous and increased exertion. The more proclaimed the parts and conditions of resistance, the more surcharged with blood the aorta or pulmonary artery would become, and the greater the dynamic power would be needed. At the same time the coronary arteries are more loaded, and hence the cardiac walls receive more nutrient blood and become thicker. This effect is superadded to the first cause, and thus these states continue to react on each other. Hypertrophy is very generally the accompaniment of dilatation. When there is increased capacity, additional force is called for to propel the larger volume of fluid, even when the orifices are normally patulous, and there is no vascular coarctation. In aneurism of the aorta and of the pulmonary artery this state eventuates, because, as Niemeyer observes, it is a fact in physics that the resistance encountered by a liquid flowing through a tube is increased if the tube be contracted or expanded suddenly. In marked aneurismal dilatation, contraction and expansion are the distinguishing characteristics, and according to the law of hydrostatics abnormal cardiac effort must inevitably be summoned. The organ, from certain adventitious circumstances, may be encumbered in its systolic and diastolic movements, and thus more force may be needed to propel its contents. Some part may be bound and fettered by adhesion, the result of a foregoing attack of acute inflammation. The writer has seen the pericardium adherent

over a great part of the ventricular surface, and thus a cause formed for the morbid thickening of the walls. Under such circumstances, its freedom of action being interfered with, greater stress may be thrown on some particular chamber, and the compensating efforts may result in the thickening of some part or parts. It is said the right ventricle, from pericardial cohesion, is apt to become hypertrophied and engorged, and that dropsy is another event in the sequence. Corvisart thought that such derangement of function is liable to come on from this cause as to be in the majority of instances followed by death. Bouillaud prominently points out how this adhesion is the forerunner of hypertrophy. Hope says it inevitably leads to hypertrophy with dilatation. Hayden remarks on this particular subject that this difficulty, the impediment to free movement, leads, as in the case of all muscles similarly circumstanced, to hypertrophy. Fothergill makes some apt observations, and goes on to assert that the heart hypertrophies when placed under circumstances when it can only labour at disadvantage, as when bound down by adhesions. And, he continues, this is an important section of the causes of hypertrophy, because here we have neither obstruction offered to the flow of blood, nor have we the heart filled under an excessive pressure. When thus incommoded the supervention of hypertrophy opportunely enables it to perform its function. When there is insufficient emptying of one or more of the compartments, engorgement and dilatation can only ensue; hence the hypertrophy instituted comes, as it were, to the rescue, and to the avoidance of evils worse than thickening. In pleuritic effusion, which, it need hardly be remarked, in the majority of cases occurs in the left side, there may be, as the writer has seen, such displacement of the heart as that the apex-beat may be found in the right axillary region, or the organ may so thrust away in an antro-posterior direction that the impulse becomes absolutely lost; in such instances there is a twisting of the great vessels, which forms a serious obstacle to the emptying of the cardiac cavities, the organ is more or less baffled in its action, it is aroused to abnormal energy, and hence it hypertrophies. Again, if the effusion be not before too long a time elapses, evacuated bands of adhesion may so tie down the heart that it cannot right itself, its dislocation is permanent, and thus the cause of its enlargement continues to obtain. Growths within the thorax may push the heart out of its position, with effects similar to those above mentioned. In deformities of the thorax, and more especially in spinal curvature, the organ may be bent to an acuter angle with the aorta than natural, and hence enlargement. In endocarditis, when the lining membrane of the cavities becomes inflamed and thickened, and one or more of the valves become fixed or glued down, laborious action and augmentation of the muscular tissue become implied. In mitral regurgitation when resistance is required to oppose an added and distending force, the same alteration is rendered inevitable. In aortic incompetency hypertrophy is the common and the predomi-

nating effect, and in none of the organic changes of the organ does thickening become more excessive; under such circumstances the heart is occasionally rendered so enormously large as to be compared to that of a bullock,—hence the term *cor bovinum* or the appellation of *enormitas cordis*. In myocarditis a yielding of the walls is succeeded by distension which necessitates compensatory growth. In *endarteritis deformans*, a degenerative transformation which destroys the elasticity of the arterial tunics and confers the state of friction to the blood-wave, hypertrophy comes on in the train of sequence. In pulmonary affections, as in empyæma, when there is impediment to the emptying of the minute arteries of the lungs, and the capillaries of the air-cells are destroyed, enlargement of the right ventricle is often discovered, and, indeed, such state of this chamber is so usual that it enters into the symptomatology and diagnosis of that complaint. It has been said that exhaustion of the sympathetic indirectly causes hypertrophy by inducing dilatation, and then the need of abnormal force. In long-standing anæmia and in exophthalmia hypertrophy follows as a physiological necessity. And in Bright's disease it was pointed out so long ago as 1817, by James of Exeter, that cardiac enlargement is one of the morbid phenomena, a fact which will be hereafter more fully considered.

Proximate or Exciting Causes.—Whatever increases the frequency and force of the heart's action is the immediate cause of its hypertrophy, and supplies that physiological stimulus necessary to this structural change. Quain regards these causes under three heads, namely those which are *nervous, mechanical, or nutritive*.

Under the first division are all those moral emotions, affections, and passions which give rise to palpitation. It has been long remarked that heart complaints—this form in especial—are produced during periods of general excitement and public calamity. Corvisart has recorded his opinion that the French Revolution was a great cause of the malady. Quain, founding his statement on the statistics of Farr, asserts that the deaths of males at all ages from heart disease have increased 50 per cent. on the increase in population, and that such increase affects adult life almost exclusively. And the same fact holds good in those who are accustomed to address public assemblies, in dramatic actors, and in those whose circulation becomes habitually quickened by some kind of mental excitation.

All physical causes, which notably accelerate the organ's contractions, and bring on a preternatural pressure of blood upon it, do the same. Amongst such are violent exercises, as rowing, in growing youths, long-continued running, mountain climbing, and the various descriptions of athletic sports when inordinately pursued. It has latterly been pointed out that great labour with the arms induces hypertrophy, as abundantly shown amongst hammer-men in iron works, or colliers, and in those who are continually lifting heavy weights. The writer has seen two illustrative cases of cardiac thickening in young and powerful men who wheeled heavily-laden

barrows of clay in the brick-fields. In such operations, all the muscles acting towards the trunk, the venous blood is pressed abnormally into the venous cavities, and the right ventricle receives an unusual stimulus. Again, by certain of such efforts of strength the forcible recoil of the columns of blood upon the aortic and pulmonary valves is apt to damage them, and hence regurgitation into one or other compartment, when thickening must ensue. In some occupations amongst the working classes a bent and constrained position may so interfere with the full and clear delivery of the contents of one or more cavities as to demand increased energy, and the consequent effect. The modes in which mechanical causes engender obstruction are numerous. Contractions and dilatations at the commencement of the arterial trunks, more particularly of the aorta, diseases of, and excrescences on, the valves, insufficiency or dilatation of the auriculo-ventricular openings, the pressure of tumours on the gravid uterus, and such states of the abdominal viscera as press the diaphragm upwards and thus embarrass the heart's action. All chronic affections of the chest which for a long time interfere with the circulation through the lungs, such as old-standing catarrh, emphysema, asthma, phthisis, hydrothorax, and those convulsive diseases which give rise to pulmonary engorgement. Inflammation is another cause, both in its immediate and subsequent effects. Hope, Lebert, and Quain, and nearly all recent writers, instance inflammation as an immediate and common cause. Andral speaks of chronic hyperæmia of the walls being followed by their augmentation in volume.

The nutritive quality of the blood, and the degree and manner in which the nutritive functions generally are carried on in the system, are here to be taken into account. In those whose blood is rich from largely eating highly nitrogenous articles of diet, and who are constantly taking stimulants, hypertrophy is common. In different habits and in opposite conditions the contrary results are noticed. In the lymphatic and leuco-lymphatic, in those of feeble organism and the ill-fed, the heart-walls are often rendered flaccid and thin, and the colour of the muscles is of lighter-tinted red. In those forms in which there is excess of connective tissue, or of adipose tissue, such are to be accounted as degenerative changes, the condition of mal-nutrition, and they have been termed false hypertrophies.

This *pathological* change was at one time regarded as a distinct entity and an essential disease, which demanded a special and direct treatment. Latterly it has been looked upon from a different point of view. In nearly every instance there is reason to conclude that it is a state called for to overcome obstruction, and that it is owing to what may be deemed salutary or compensating efforts. The organ suffers on a divergence from the standard of health from a derangement of the equilibrium of its dynamic capability and the propulsive requirements of the vascular system. So long as the

obstruction remains, the capacity for increased work, the augmentation of muscular substance, continues to subsist ; and with the immediate or gradual decline of the anomalous cause to freedom of action there is a relative diminution of the hypertrophy. It is mostly favoured under the conditions of good general vitality. Between frequency and force of action there is the just correlation of growth. Some writers have sought to maintain that its primary origin is inflammatory, but such doctrine as an absolute rule is erroneous, because the state may obtain without any of the recognised products of inflammation. Inter-ventricular pressure, however induced, must be followed by frequency and force, and the more obvious effects are arterial tension, stronger præcordial impulse, and less compressible radial pulse. With the increase of the muscular structures there is proportional enlargement of the coronary arteries, and thus a fuller flow of nutrient blood to the parietes and their over-growth. Gowers says that increased blood-pressure within the heart during its systole is the common cause of its muscular over-growth. It has already been cursorily noticed that the volume of the blood in the circulation may be abnormally large ; hence when its chambers are over-filled a stimulus is present urging the organ to empty its compartments with more vigour and celerity. One ventricle may at the first be alone increased, but if the cause of impeded freedom of action continue, the entire volume of the heart, as a rule, at length becomes augmented. It has been known to become four times larger than the natural size. Hayden says that nervous excitement and over-exertion of the voluntary muscular system alone give rise to primary or uncomplicated hypertrophy. But hypertrophy seldom remains uncomplicated, or if such be allowed, it does not produce a fatal result ; and therefore we are not supplied with the means of observation for any decision to be arrived at relative to this question. It may be remarked in general terms that in all instances where there is continuous resistance to the onward flow of blood, or which is greater than the power of the organ to overcome, and particularly when the obstruction is *before* the hypertrophied cavity, there is also more or less of dilatation as the accompaniment. Simple hypertrophy has been regarded as more likely to occur in certain forms of Bright's disease. The probabilities of dilatation will depend much on the general degree of vitalism in the tissues. Where the degenerative tendencies subsist the compartments will have a proneness to enlarge.

Conditions of Obstruction which are followed by and are associated with Hypertrophy.—One of the most common causes of the lesion is in *aortic stenosis*, which comes on from organic thickening of, calcareous changes in, or from growth or vegetation upon the valves ; and it may also be from inflammatory deposits beneath the fibrous tissue, whereby the aperture is rendered permanently narrower than normal. With a state of stricture at this outlet, it hardly needs to be insisted upon that there is required in the organ an increase of force to urge the blood through a small e

and more rigid passage. In early life the impediments at these parts are mostly produced by acute rheumatism. In middle and later life, and when rheumatism cannot be assigned in the causation, the atheromatous conversion is usually present. In the last named pathologic state there may be the loss of elasticity and absolute stiffening in the coats of the arterial trunk; with roughness and irregularities in the inner surface of the vessel, all of which would oppose the onward flow of the fluid in its systemic course, and tend to excess of function and augmentation of the ventricular parietes. In exceptional cases, pyæmia specific and exanthematous fevers, renal disease, and syphilis, may produce such an amount of endocarditis as may coarctate the orifice. In *aortic regurgitation* hypertrophy is sometimes seen in such extreme degree as to call forth the term *cor torinuum*; and dilatation is generally the accompaniment. Again, vegetation, stiffening, atheroma, or tearing or perforation of the valves, may be the states preceding the sequential alteration now described. Quain says the valve segment is sometimes lacerated, and the free edge retroverted into the ventricle. The writer has known ruptures of the aortic valve, followed by incompetency, dilatation, enlargement, dropsy, and death, which were clearly traceable to the strain consequent on lifting heavy weights. Hope says that hypertrophy combined with dilatation, either in the left ventricle alone, or in the two conjointly, is the most ordinary form of organic disease of the heart. In this kind of valvular lesion, there is little or no obstacle to the backward blood-flow into the ventricle, or the aortic systole; it is not as normally arrested by the semilunar valves, and although the regurgitant stream may at the first be very small, it soon increases, and is driven more forcibly into the compartments than is poured the fluid from the pulmonary veins and auricle. Again, the coronary arteries, under these altered circumstances of the contents of the cavity, do not receive their full complement of blood, and hence the cardiac walls are imperfectly nourished, when degenerative mutations ensue. From what has been said there is not only an increase of internal pressure demanding augmented efforts of ventricular contraction, but a cause for molecular change in the tissue elements of the cardiac walls. If the dilatation do not become excessive, the compensating hypertrophy throws forward a stream of blood equal to the aortic and systemic requirements, and thus between the regurgitant stream and an augmented power of propulsion, a sort of balance under difficulties, and conservative in effect, becomes established; nor could a better illustration be supplied of the fact that hypertrophy is a natural and healthful reaction, which supervenes on some foregoing obstruction. *Aortic Aneurism* is another pathological condition which precedes hypertrophy, and which has long been instanced as one of its causes. Walshe gives it as his opinion that hypertrophy sometimes comes on in, but is not the invariable consequence of, aneurism. Gowers has quoted Axel-Key, who has recorded eighteen

cases of aneurism occurring near the heart, in none of which was there hypertrophy of the left ventricle; and in certain of these examples cited there was a diminished cavity with thinning of the walls of the left ventricle, and which was accounted for by the tumour pressing upon the pulmonary artery. Still, on the whole, the view which has been taken on this subject by the majority of writers since the time of Corvisart, and which is adhered to by Niemeyer, is the most tenable, that whenever the great vessels which spring from the heart have become aneurismally dilated, an additional demand is made upon the ventricular energies to urge a greater volume of blood than normal forward, and that such superimposed tax upon contractile power is met by increase of muscular structure. Other *tumours* besides those which are vascular may by their pressure impose difficulty on the cardiac working, and be succeeded by the same result. In *mitral stenosis*, which is characterized by rigidity, thickening, adhesion of the edges of the valves, shortening of the tendinous cords, fibrinous formations, polypi, and calcareous depositions, the aperture may become so narrowed as to assume what has been termed the button-hole formation, or it may be so lessened as to hardly admit a quill. The left ventricle may then only receive an insufficient quantity of blood, and not being stimulated to its ordinary functions the parietes may become thin and softened; but the left auricle under such circumstances, as a narrowed valve in front, becomes thickened and dilated in its efforts to counteract a distending pressure. A backward engorgement of blood is then liable to eventuate, when the right ventricle becomes hypertrophied and dilated. Such change having taken place in this last named compartment, pulmonary obstruction and pulmonary apoplexy may come on in the train of sequence. Another state which has to be noticed is that of *mitral regurgitation*, which is produced by tearing or perforation of one of the valvular curtains, or by one or more valves being adherent to the cardiac walls, or by thickening and deformity of the orifice rendering it permanently patenscent. When the mitral orifice thus remains open, the blood regurgitates into the auricle, which has to sustain, in addition to the pressure of abnormal fulness, the ventricular impulse. The compensatory power called forth is not to overcome a forward obstruction, but to counteract the otherwise evil effects of a distending force. At each systolic contraction there is an escape of blood backward into the left auricle, as remarked, which augments the quantity naturally coming into it from the pulmonary vessels under the influence of an hypertrophous right ventricle; hence follows distension during the diastole, and, as the sequents of such, distension and dilatation and hypertrophy. Mitral insufficiency then, like mitral contraction, constitutes obstruction in the left side of the heart, which may, as Hope says, be propagated backwards to the right side. The hypertrophy from this cause is never so excessive as in aortic regurgitation.

Hypertrophy in the Right Ventricle is very rare indeed, unless associated with dilatation; and it is nearly always a secondary condition consequent upon left heart disease, or more immediately upon pulmonary obstruction. It is doubtful if ever simple hypertrophy of the right ventricle occur. Disease of the pulmonary orifice, unlike disease of the aortic orifice, is most infrequent. It is rare to find the pulmonary valves implicated even when there has been resistance to the pulmonic current. Stenosis of the *tricuspid* valves is hardly ever met with. Regurgitation through this opening is not uncommon as a secondary condition. Dilatation with hypertrophy renders wider the tricuspid opening, but enlargement of this chamber is accompanied by dilatation of the valve, the tendinous cords, and the papillary muscles, and there may not be regurgitation when the valve apparatus is not morbidly altered. In tricuspid insufficiency may be met with shrivelling-up and deformity, as seen in the mitral valve. When there is mitral lesion, stress and difficulty are thrown on the right side of the heart, which lead to dilatation and hypertrophy of the right ventricle. Primary obstruction of the lungs first affects the right ventricle when it is surcharged with blood, and becomes overpowered in its efforts, and thus the right auricle is over-distended; then the return of venous blood is obstructed in the entire venous system, the *venæ cavæ* are overloaded, and in the backward retardation capillary congestion finds relief in transudation into the cavities, or the areolar tissue or vascular giving way produces hæmorrhage. The retardation is extended through the capillaries to the minute arteries, and in this way, as Hope observes, is explained that which appears an anomaly—that the left cavities are sometimes rendered hypertrophous by an obstruction in the heart, situated behind them in the course of the circulation, as when the left ventricle becomes enlarged and thickened by a foregoing contraction of the mitral valve. When the pulmonary artery has become subject to abnormal pressure, and this strain upon it is continued, degenerative changes may come on in its coats, a condition superadding to other causes productive of right side hypertrophy. The parietes of the right auricle are under wider distension liable to dilatation, but they are sometimes found considerably thickened. Most pathologists have emphatically remarked that dropsical effusions and pulmonary apoplexy are common sequents in enlargement of the right ventricle. We now know, however, that embolism is by no means an unusual explanation of those sanguineous extravasations and deposits, which were termed pulmonary apoplexies. It can well be understood how an embolic blockage, under the augmented force of right side hypertrophy, would greatly tend to vascular rupture on the pulmonary substance.

There are various pathologic changes, to which a passing reference has been made, that are to be considered more particularly in right side enlargement. There may, from some more general condition, or from some local cause, be obstruction in the arterioles

and capillaries of the pulmonary organs. In emphysema, the over-filled and stretched air-cells lengthen, and contract the calibre of minute vessels, and thus more force is called for to urge on the circulation against such state of resistance. In cirrhosis of the lungs compression and abolition of small vessels produce obstruction. Quain has pointed out that in phthisis, when large portions of one or both lungs become impervious to air, by tubercular deposit and the products of that low and passive form of pneumonia, so common in this disease, such interference is given to the pulmonary circulation, and the venous system in especial, that hypertrophy is the frequent concomitant. It has long been asserted, and by statistics abundantly proved, that pregnancy tends to render the heart hypertrophied. The additional work thrown upon it by the placental circulation is followed, and more especially so after repeated pregnancies, by the change now considered. In pleuritic effusion, independently of that dislocation of the organ and the twisting and distension of the great vessels which arise from it, the pulmonary substance may be so pressed upon as to constitute an important and abiding cause of obstruction, and thus the cardiac compartments, more particularly of the right side, become dilated, and their walls augmented. Again, by a larger amount of work being thrown upon the heart and great vessels, the increased power to overcome resistance, when continued, gives rise to degenerative changes, not only in the cardiac parietes, but of the vascular coats. An abnormal and persistent strain upon any part, and eminently so upon vital organs, cannot go on for long without alteration of structure. And if such augmented function come on in middle or declining life, and the heart and great vessels are overtaxed, the coronary arteries are liable to be diseased, and the stiffening and tortuosity of the great arterial trunks, with roughening and inequalities of their inner tunic, are not unusual events. Degenerative changes, then, may be produced by, as well as they may be the antecedents and the causes of, hypertrophy. When inflammation of chronic character becomes instituted in the external or internal membranes of the heart, valvular complication is the very natural result, and thus an impediment to its free and unfettered working. And again, the irritation and stimulus which are imparted to ventricular action by the inflammatory process, are the sure forerunners of muscular augmentation. In pericarditis this condition in greater or less degree seldom fails to follow. Bouillaud says that of thirty-three cases which he has recorded of pericarditis and endocarditis, in which there were thickening and induration of the inner and outer membranes, there was also in addition undoubted hypertrophy; and the testimony of other and more recent writers on this particular point is confirmatory of the correctness of this observation.

In *Bright's disease* hypertrophy is the common concomitant. More than half a century ago, James, of Exeter, directed the attention of pathologists to the great fact that obstruction in the small

arteries caused a general impediment to the circulation, which at length led to hypertrophy of the left ventricle. After that announcement Bright, holding to such view, expressed the opinion that the altered quality of the blood might so affect the minute and capillary circulation, as to render greater action necessary to force the blood through the distant subdivisions of the vascular system. Traube afterwards wrote on the connection between chronic heart and kidney disease. He imagined that contraction of the kidney impeded the flow through it, and caused cardiac hypertrophy. This writer prominently put forth the idea of left heart disease being preceded by a disturbed condition of the aortic circulation. He also maintained that increase of tension within the aorta comes on partly from abnormal fulness of this vessel, from which a reduced amount of liquid is withdrawn into the kidneys, which by increasing the difficulties to the emptying of the left ventricle would bring on hypertrophy. Bamberger has objected to such pathologic explanation, and asserts that hypertrophy begins in the earlier stages of Bright's disease, that it affects the whole, not one part, of the organ, that the aorta may be contracted, not enlarged, and that the abolition of a few renal capillaries would not be followed by hypertrophy. Traube's doctrine at one time gained wide credence on the Continent; but it was never broadly accepted in this country. Here the mere obstruction of the kidney has always been considered as too inadequate for a result so great and important to the system. The increase of the left ventricle under the change now particularly spoken of is often of the simple kind, that is, without dilatation. There is increased tension of the arterial blood, which the sphygmograph has so manifestly demonstrated, and the hardness and sometimes incompressibility of the pulse is a distinctive characteristic. In 1850, George Johnson propounded certain original views, which threw great light upon this particular part of pathology, which had heretofore been obscure, and Johnson's views are still in the main regarded as the most correct. He then showed that in the smaller arteries a change may come on, which he said is hypertrophy of their muscular coat, and that such change may not be confined to the kidneys, but extend throughout the system. And this view is now very broadly received as true. He referred this alteration to a permanent spasmodic contraction, which is necessarily followed by an augmented resistance to the flow of blood through the arteries and its increased tension. And augmented tension is followed by augmented endocardial pressure, and a freer circulation in the small arteries. In the more recent deliverances of Johnson on the relation of renal disease and hypertrophy of the left ventricle he says hypertrophy of the muscular tunics of the arterioles is consequent upon the increased contraction of the small arteries excited by the abnormal quality of the circulating blood, and that hypertrophy of the left ventricle comes on as a natural result from resistance to the blood stream in the arterioles. His cardinal

conclusions are, disease of the kidney and imperfect depuration of blood; arterial spasm producing augmentation in their muscular coats and impeded blood flow, and hypertrophy of the left ventricle caused by such obstruction to the circulation. Ludwig has declared that the cause of this spasm in the minute arteries is primarily referrible to the retention of urinary salts and their morbid effects upon the vaso-motor centre, and this experimenter's notion has been endorsed by Bezold, Therry, Cyon, and others. Fothergill remarks that this spasm of the arterioles, by reducing the general flow of blood, also reduces the general chemical interchanges, that there is less waste, and thus the blood surcharged with waste, and imperfectly depurated, is prevented from further poisoning, and hence the phenomenon of arteriole spasm becomes as it were conservative. It may here be noticed that Gull and Sutton have denied the existence of hypertrophy of the muscular coat of the arteries. They say the thickening is a *fibrosis*, and attribute the vascular obstruction to the inelastic nature of this tissue; they also maintain that the fibrosis is a primary and general change, and that it is not the sequent of renal disease. They aver that the kidney complication is but one local instance of its effects. The majority of pathologists hold with views first enunciated by Johnson. As Gowers well expresses himself on this head, it seems that hypertrophy of the heart occurs in kidney disease dependent on increased arterial blood pressure resulting from obstruction in the minute vessels, that the obstruction is in many cases caused by kidney disease, and that it is generally accompanied by disease of the smaller arteries to which it is in part to be ascribed.

Pathological Anatomy.—The first consideration under this head is to consider what are the fundamental changes which take place in the muscular tissue. Lebert says that hypertrophy as a term generally applied consists in an increase in the essential constituent molecules of a tissue or organ, and increase of nutrition with excess of materials; and Rindfleisch defines hypertrophy of the heart as an augmentation of its volume which has its foundation in a hyperplasia of the myocardium. There is no growth of tissue different from natural heart fibre. There is an increased number of fibres which in all respects exhibit the normal and healthy characteristics. The colour is darker and redder, and sometimes the redness is brighter than usual. As the ordinary rule, the heart in women averages eight ounces, and that of men ten ounces. In what is termed the *cor bovinum*, or bullock's example, the organ has been known to attain the enormous weight of forty ounces. The hypertrophy of the left ventricle differs from that of the right. The first named can generally be torn with facility, and the last mentioned usually acquires with its thickness a leathery toughness. Why there should be this difference it is not easy to determine. It is essential, however, to bear in mind such peculiarities in the augmented walls of the respective compartments. As a rule, the heart becomes larger from

infancy to age. In people who are very large and powerfully made the viscus may be found relatively beyond the common size. It may be said that the mean circumference of a natural heart at the base is about nine inches; its length from the root of the aorta to the apex about four inches; its transverse diameter a little below the base of the ventricle four inches; the average thickness of the walls at the base of the left ventricle is from six to seven lines, of the right about two-and-a-half lines, of the left auricle one-and-a-half lines, and of the right auricle about a line. The wall of the left ventricle may become thickened to one or even one-and-a-half inches, and the thickest part is usually about the middle of the ventricle, where the columnæ carniæ are inserted. When there is dilatation with hypertrophy the fleshy columns become stretched and attenuated. In other cases they are simply augmented in circumference. The inter-ventricular septum is less liable than the walls to be thickened. The right ventricular wall may become thickened to the extent of an inch, and its greatest measurement is at the base. The columnæ carniæ in this compartment are even more liable to become enlarged than the parietes. The hypertrophy may be confined to one cavity, or to some particular part of the organ. There may be abnormal thinning of one part and thickening of another. When there is general dilatation of the cavities the organ may be greatly enlarged without any notable thickness of the walls. When the left ventricle becomes thus greatly augmented in bulk, it fills up the left præcordial region, and extends up under the sternum. The auricular walls are very rarely found thickened beyond double their natural size, and when such is the case, there is nearly always dilatation. The left auricle is more prone to thickening than the right. In marked hypertrophy of the heart there is change of its configuration. It then affects the normal position of the thoracic viscera, and its situation becomes altered. It is rendered more globular, its apex is tilted up, and in right-sided hypertrophy it falls lower down, and occupies, in its long diameter, a transverse direction. If the left cavity be the seat of this affection it forms more of the apex than it ought to form, and may even fully constitute the apex. If the hypertrophy be mainly in the right side the sphericity of the organ is a distinguishing characteristic, and the apex becomes formed by it. The majority of writers assert that the heart attains the greatest magnitude in hypertrophy of the left ventricle. In those instances in which has preceded peri- or endocarditis, the products of inflammation will be discovered, and there may be adhesion or the more common accompaniments of valvular disorganization. In old-standing adhesion and when there is hypertrophy, the heart may be held up higher than it would otherwise be, because when enlarged it gravitates downwards.

The capacity of the four compartments in an adult and healthy heart may be regarded as being about equal; the great external difference is caused by the thinness of the auricles and the fleshiness

of the ventricles; and thus the auricles seem to make up only about a third of the organ. It is desirable that these relative proportions should be borne in mind on postmortem examinations. From what has already been said in this article, the hypertrophied condition may in the very great majority of cases be regarded as being of one of two forms, namely, either the *simple* or *excentric* variety. A range of names might here be given, who have recorded the opinion that in very exceptional instances *concentric* hypertrophy does occur. In the alteration now considered there is, also, increased development of the fibrous tissues between the primitive bundles, and when this element becomes largely increased a fibroid degeneration may be said to subsist, and Quain in describing this state asserts that the colour of the parietes assumes various tints, from the normal redness of the muscular substance to a light grey hue. Simple hypertrophy is nearly always the first and preceding condition, which is followed by hypertrophy with dilatation. As a pathologic and sequential event, excess of function enlarges the area of a compartment. Walshe states that in general hypertrophy of this organ the thickening is always excentric. When there is a renal origin of the hypertrophy the left ventricle is first affected; tissue change succeeds; and under the influence of mal-nutrition, the ventricle loses its propulsive power, and the other chambers, through pulmonary, arteriole, and venous obstruction, are rendered of larger capacity. In some examples there is thinning of the walls of the right ventricle, with thickening of the left. And there may be what has been termed mixed cases, in which the wall of a cavity, as above remarked, may be attenuated at one part, and augmented in substance in another. In deciding upon the presence or absence of hypertrophy the capacity of the chamber should always be carefully considered. It is not sufficient to merely regard the absolute thickness, as there may be a greater extent of wall. The augmentation of the wall is relatively according to the amount of hypertrophy, and inversely as to enlargement of capacity. The degree and kind of thickening will depend much upon the amount of healthiness and vitality of the system; still, however, it must be borne in mind that the obstruction and the power needed to overcome it is the main cause of hypertrophy. When the muscular substance is of paler colour than normal, the augmented parietes must rather be referred to these degenerative conditions, which are more fully described in another part of this work. In the fatty and fibroid forms great thickening is a prominent feature in such examples. There may be in the change accumulation of fusiform, involuntary fibres, and which do not become developed into the higher state of striped fibres. When the thickness is from excess of connective-tissue, such is termed false hypertrophy, or when this is the case the augmentation of substance does not represent an increase of, but rather a loss of power. In true hypertrophy the coronary arteries become relatively enlarged, and thus there is additional

activity of the vital and nutritive endowments of the organ, and another explanation is afforded of the abnormality of muscular development.

Complications and Sequences.—When reviewing the varied morbid phenomena in cardiac hypertrophy it is important to distinguish those conditions which are more properly attributable to the primary causes of this particular change in the organ's structure than to the change itself. Certain diseased conditions are not unfrequently in association with hypertrophy, but which are not the result of hypertrophy, as it was formerly supposed. The knowledge gained by more recent research has in most instances enabled us to recognize these fundamental differences. It can often be shown that congestive, œdematous, and hæmorrhagic states are referrible to a primary vice in the system, and in relation to which the hypertrophy may be looked upon as conservative in its effects. In the simpler form of parietal thickening, when the obstruction is aortic or mitral, there may be no backward evil consequences; in the first named cause the increase of ventricular power may be equal, or more than equal, to the impediment; in the last mentioned, an augmented left auricle may prevent pulmonary congestion; and the increase of force in a thickened right ventricle may free the lungs from venous obstruction, and also save from abnormal efforts the left ventricle. Excess of function may produce, if long continued, disease of the arterial tunics, and the atheromatous degeneration may eventuate. In chronic inflammation of the lining membrane of the organ the irritation, inducing increase of muscular action, has at length as its accompaniment hypertrophous thickening. Of thirty-three cases of peri- and endocarditis recorded by Bouillaud, and in which there was membranous thickening, there was also muscular augmentation in every instance.

There is no fact in pathology more thoroughly established than that intimate correlation which obtains between cardiac and cerebral disease. Sanguineous apoplexy and cardiac hypertrophy are now known as concomitants of frequent occurrence. Quain has recorded that in sixty-five cases of apoplexy collected by himself, in no less than two-thirds there was hypertrophy, and in one-half valvular disease. The increased propulsive power of an enlarged heart upon the thinner cerebral arteries and their rupture can be well understood. In those degenerative changes, which, as we now know, so often take place in the arteries in more advanced life, and which belong to the heterologous transformations of age, their less elastic and weakened coats are liable to give way under the more forcible pressure of a præternaturally stimulated and more powerfully propelling heart. Again, embolism gives another explanation of what is liable to eventuate in these cases. In endocarditis valvular disorganization is followed by hypertrophy; and in the roughening of the valves pieces of lymph are formed, become set free, and are carried onwards in the stream of the systemic current to produce blockage in

the cerebral arteries; hence softening from the cutting off of nutrient blood, congestion, serous effusions, and the giving way of the smaller vessels. Hypertrophy of the left ventricle is more prone than the right to give rise to cerebral hæmorrhage. The larger arterial branches at the base of the brain are not unfrequently healthy when the smaller ramifications are diseased. It sometimes happens that in young subjects there is apoplexy in conjunction with heart disease. In such instances embolism or aneurism of the cerebral arteries constitute the most common cause.

Pulmonary congestion, hæmorrhage, and œdema have long been regarded as sequents in the enlargement of this organ. The thickening and augmented force of the right ventricle form a common cause of engorgement and apoplexy in the lung substance. The increase of power in this chamber not only surcharges with blood the pulmonary arterial system, but the continuous stress and tension are frequently followed by more or less of degeneration of the tunics of the pulmonary artery. Another of the primary causes of hæmorrhage into the lungs is narrowing of the left auriculo-ventricular orifice and mitral disorganization. Hypertrophy of the right ventricle is mainly caused by change in the pulmonary artery; and obstructed return of blood from the lungs, from alteration of the left auriculo-ventricular orifice or mitral disease, are the most usual pathologic changes in the production of pulmonary hæmorrhage. Serous infiltration into the pleural cavity and sanguineous exudation or more active hæmorrhage in some part of the course of the bronchial membrane, are amongst the various effects of cardiac hypertrophy. There is no doubt that pulmonary embolism is often a fundamental condition, when in accompaniment with thickening of the right ventricle, which is succeeded by vascular rupture and those extravasations known as pulmonary apoplectic patches. Hope remarks that hypertrophy is followed by increase of force and activity in the circulation, and when such overcome the natural tonic power of the capillaries, infiltration into the chest, and other phenomena succeed. When there is dilatation as well as thickening of the right walls, dropsy and dyspnœa are very probable to supervene. Emphysema is also a result.

It has already been shown how usual it is in renal disease to have as a complication and consequence the heart hypertrophied. Dilatation of the cavities in that widespread ailment in the system is often noticed in marked degree. The embarrassment conferred to the venous circulation is evinced by the livid countenance, the accelerated respiration, the passive hæmorrhages, and the capillary transudation. The left ventricle in labouring to surmount the distal difficulty of contracted small arteries, and capillary engorgement, is stimulated to exertion, and becomes augmented in volume by excess of function. In contracted kidney sanguineous apoplexy in association with cardiac hypertrophy has been by various pathologists insisted upon as of not unusual occurrence. The *simple* form of

hypertrophy may go on for a very long time, without giving rise to any other form of disease, and more especially in those of robust health. Amongst the working part of the population it often obtains when not at all suspected. Cerebral affections are liable to come on in this description of the affection. Enlargement of the heart doubtless runs its course more quickly when there is also dilatation, and it is in this form in which the palpitation, dyspnœa, and anasarca are often prominent symptoms. Patients labouring under cardiac hypertrophy are apt to be gravely influenced by the supervention of febrile and inflammatory diseases. An accelerated circulation adds potently to the organ's embarrassment, and such unfortunate events as one or the other of these acute maladies may induce complications of the most serious or of fatal character. When the right side of the heart becomes dilated the venæ cavæ are apt to be enlarged, and thus the hepatic venous circulation is obstructed, and as a consequence the entire portal system is rendered implicated, and ascites becomes a sequent. From the intimate relation subsisting between the splenic vascular arrangement and that of the liver, the spleen as another result is liable to be congested, and it is thus sometimes considerably enlarged. All systematic writers on the lesions incident to the two last named organs instance cardiac hypertrophy as one amongst other conditions entering into their respective causations.

Symptoms.—In simple hypertrophy the general and more apparent symptoms are an animated and sometimes flushed countenance; the circulation is not unfrequently accelerated; muscular exertion renders the breathing quicker; and there may be some cough, which is often disregarded. The conditions are usually not such as to attract the patient's attention. There is no venoid discoloration of the face. There may be no hæmorrhages, no serious congestions, nor any effusion into the cavities. The prominent, graver, and more cognizable symptoms are rather such as arise out of those complications and antecedent conditions with which hypertrophy becomes associated. Various phenomena, which are regarded as cardiac indications, often would obtain in more pronounced degree, if it were not for the organ's augmentation of volume, the thickening being really resistive against greater evils, conservative in its tendency, and not a primary cause of morbid changes. It often happens that in cyanosis and dropsy this remark receives full confirmation. The more obvious conditions can only receive acceptance in association with precise and defined physical signs. Hypertrophy with dilatation is the most easily recognized on a first and cursory review. It is always expedient at once to ascertain which is the chamber affected. When there is hypertrophy of both ventricles the arterial system becomes abnormally filled; the afflux of the blood to the heart during the diastole is easier, and thus the result is over-filling of the arteries, and under-filling of the veins. It may be held in mind that the symptoms and signs of hyper-

trophy will be in just correlation to the augmented size and to the increased force of the heart's action. The affection may exist, even in great degree, without the patient being at all conscious of it, and, as previously remarked, the parietes as a natural event tend to become increased in thickness with the advance of age.

Inspection.—When the organ is considerably enlarged, and there are no adhesions, it gravitates down to the lower part of the chest; the obliquity of its situation becomes more pronounced, and it may assume almost a transverse position. To the eye the contour of the thorax is thus altered. Its left base looks larger than the right base. When the left ventricle is greatly increased in size there may be evident bulging near the præcordial region, extending in the left direction. When the right ventricle is hypertrophied the lower third of the sternum seems as if it were thrust outwards; there is then a rounded smoothness of configuration of the epigastric region, and the intercostal spaces in the left chest-wall are less defined. In the young, where costo-sternal cartilages and white textures generally are less resistant, the left thoracic border may from the cardiac pressure be rendered prominent.

Palpation.—On placing the palmar surface of the flat hand over the præcordial space the hypertrophied heart is felt to act with unwonted energy. The apex-beat impulsates over a wider diameter than normally, and the area feels full and rounded. Muscular exertion renders still more forcible the beating. In valvular or aortic disease, and when there is pericardial adhesion as the complication, the impulse is strongest and most violent. When there is great enlargement of the left ventricle without dilatation, the apex-beat, instead of being at the fifth, may be felt so low down as the seventh or even eighth intercostal space, powerfully and well-defined. When there is considerable dilatation the impulse is more diffused, and it rather imparts to the hand a heaving sensation than that sharp, circumscribed knock against the chest-wall when there is mere simple thickening. The shock conferred by hypertrophy, as when it is total and eccentric, over a large space is not to be confounded with that gastric pulsation which is produced when the left lobe of the liver becomes dislocated downwards, and when the jar of systolic action is extended to that viscus. When the heart is of normal size the shock is felt over one or two interspaces only, but in great and bovine hypertrophy it may be felt over several of these spaces. When the right ventricle has acquired augmentation of volume the lower third of the chest-wall and the sternum may be shaken.

Dyspnœa.—When the affection is not excessive, when there is no complication, and when the patient is tranquil and at rest, the breathing is generally easy and natural. Mental excitation and bodily effort, however, at once induce more or less of difficulty in the respiratory functions. The patient then pants, he will remark that he loses his breath, but the inconvenience is but temporary.

When he again becomes composed and still, it soon subsides. A sudden surprise, grief, joy, the hurrying upstairs, lifting great weights, leaping, running, and such causes—in fine, whatever accelerates the circulation, will bring on uncomfortable breathing. In those instances, which are excessive examples, even when there is no complication, the due expansion of the lungs by the heart's volume may be mechanically interfered with, and dyspnoea the result. In excentric hypertrophy with dilatation, and more especially when such obtains in the right cavities, when pulmonary obstruction, congestion, œdema, and effusion are the associates or sequents, dyspnoea is often a common, painful, and prominent symptom.

Cough.—There is occasionally a dry, irritating cough in this affection, but as a rule in simple hypertrophy there is little or no cough. In young and plethoric women, who labour under this complaint, a wheezing cough may be complained of. In right side hypertrophy, when pulmonary obstruction and dropsical effusion come on, this particular symptom is rarely absent; it often obtains in marked degree, and so much so as to add not a little to the other discomforts and difficulties which are experienced.

Hæmoptysis and other Hæmorrhages.—Hæmoptysis from capillary engorgement is no uncommon event. It is generally sudden and active, and the blood thus lost is sometimes considerable. In left ventricular thickening, Niemeyer says, there is often active distension of the bronchial arteries. Under such repletion they are apt to rupture. And with this form of hypertrophy, and especially when there is valvular disease or aortic impediment, the cerebral arteries are liable to give way. When this morbid change is in the right side the pulmonary artery and the pulmonary system become overloaded with blood; as a consequence the circulation in the liver and spleen is influenced, and hence there may be hæmatemesis, melæna, or epistaxis. When the blood comes from the lungs it is mostly bright and arterial-looking.

Palpitation is a common symptom in all organic diseases of the heart. In the form now considered it sometimes obtains in marked degree, and it is an evidence that the augmented thickness of the parietes is rather unequal to that in excess of the power needed in the emptying of the cavities. It is the increased effort to overcome obstruction, and it always implies undue excitation of the cardiac nerves. Under the hypertrophied condition, the least excitement, bodily or mental, is sufficient to induce a greater or less degree of this obvious symptom. When the disease is of long standing, and when it has become excessively proclaimed, and especially in excentric hypertrophy with dilatation, distressing paroxysms of palpitation are apt from time to time to supervene. Fothergill says it is the outward visible sign of internal incompetence. Indigestion, flatulency, and an overloaded state of the bowels, are conditions which induce the attacks. When there is much dilatation with thickening the palpitation may be unrhythmical, irregular, and intermittent;

and when such are the qualities in addition to abnormal force and frequency of action, the peril of the patient becomes more declared and absolute.

Pulse.—In cardiac diseases the conditions of the pulse are diverse and varied according to the chambers affected and the kind of co-existent complication. The feel of the radial pulse alone will often at once lead us to suspect hypertrophy. In the simple form of this affection it is stronger, fuller, tenser, and far less compressible than natural, and, as Hope observed, it *dwells* longer under the finger. The augmented walls have more force and require more time for contraction. It is the hardest in left side hypertrophy. When there is hypertrophy with dilatation, the force, volume, and prolongation are pronounced in the greatest degree. When the dilatation relatively exceeds the hypertrophy, there is diminished strength, more fulness, and greater slowness. These conditions may be simulated when referrible to neurosial causes, as in the vaso-motor irritation of encephalic pressure. In aortic obstruction with left hypertrophy, the pulse is strong, incompressible, small and sustained. In aortic regurgitation it feels, as it has well been described, as if liquid balls passed under the finger. In mitral obstruction it is small and regular. In mitral regurgitation it is irregular in size (not necessarily in rhythm), some beats being smaller, others larger. In hypertrophy with contraction it is small and tense, or it may be small and weak. As the rule, in hypertrophy of the right ventricle, the radial pulse is characterised by smallness, weakness, intermittence, and irregularity. When there is atheroma in association the pulse is bounding. In the mere hypertrophy of age it is full and slow, but comparatively more compressible than its volume would indicate.

There are certain *cerebral* indications, which taken in accompaniment with the above-named and more direct symptoms are here to be noticed. After muscular efforts, and when the heart's action becomes accelerated, the patient will experience a feeling of fulness, and it may be of throbbing in the head. Sudden movements, stooping to put on the shoes, ascending steep stairs, straining at stool, and fits of anger and passion, bring on these sensations. In pronounced cases, in the vascular and plethoric, ringing in the ears, vertigo, headaches, muscæ volitantes, visions, and disturbing dreams are sometimes produced. And the condition of hyperæmia of the vessels proper to the brain is evinced also by the bright and shining, and it may be the somewhat blood-shot eyes. The patient will in certain examples complain of shooting pains in the head, and sometimes of aching at the occiput. When these symptoms are marked and persistent there are the probabilities of paralysis or apoplexy.

Left ventricle.—Hypertrophy of the left side greatly resembles total hypertrophy. It does not produce much disturbance in the respiratory function. Palpitation is a prominent symptom. Cerebral complication is more frequent in left ventricular than in any

other form of cardiac thickening. This chamber under the change becomes elongated, it may be from half to three-quarters of an inch beyond the end of the right side. The patient often complains of violent headaches, and nervous irritability and excitation frequently obtain in marked degree. Its effect on the brain and the encephalic circulation is as usual, and obviously correlative, as these pulmonary conditions and sequents which are so often in association with enlargement of the right side of the organ.

There are certain characteristic and well-defined *physical signs*, which are all important in forming a diagnosis as to the particular kind of thickening which may subsist. In left hypertrophy the chest-wall is on that side often more prominent, and more particularly is such the case in young subjects. Sometimes the præcordial region bulges, and several of the costal interspaces are more extended. Walshe says there may be some convexity of the cardiac region from the third to the seventh cartilages, and that the interspaces are rendered wider, but they do not bulge.

In *simple hypertrophy* the enlarged area of *impulse* may be visible, and seem to move the left thoracic wall. On the application of the hand it may be felt over the fourth, fifth, and sixth interspaces. There is marked augmentation of force. In extreme cases the feeling is that of a slow increasing and swelling movement, and nearly all writers have designated this characteristic as being that of a heaving motion. Walshe describes the sensation as a slow heaving, or a pushing forward as if against an obstacle. The duration of the heaving is relatively in proportion to the degree of hypertrophy. Lænnec has stated that on the application of the stethoscope the power of impulsion is often sufficiently strong to raise the head of the observer; and other authors have remarked that this increase of action is often such as to move up the bed-clothes. A larger proportion of the heart's surface impinges against the chest-wall. When there is co-existent valvular disease a vibratory, jarring sensation is given; and when there is pericardial adhesion in addition, the impulse is a sort of jogging motion. In anæmic patients the feeling is that of a thrill. In *hypertrophy with dilatation* the impulsion is of wider area, and the contractions are felt as being more like sharp blows and shocks, and the motion is conveyed to greater distances from the præcordial centre, than is the case in simple enlargement. In some examples of this form the vibrations extend to the top of the chest-wall, and it may be through to the left back, and the carotids, temporal, and other arteries may be seen to pulsate. When dilatation predominates over hypertrophy the pulse may be slow, large, weak, and compressible. The writer attended a late and distinguished member of the profession, who had a largely hypertrophied and dilated heart, and the pulse was generally below forty. The back-strokes, or diastolic impulse, which does not obtain in simple dilatation, is recognized rather as a sort of succussion against the parietes; and

Walshe says it is particularly obvious in cases where solid accumulations lie behind a hypertrophied heart.

On *percussion* the normal lines of præcordial dulness are extended—often considerably—and especially in the left transverse direction. The superficial and deeper dulness is exceeded. In configuration the space of the dull sound is abnormally ovoid, or tending to an obtuse-angled triangle, and is downwards. When there is excessive hypertrophy with dilatation the dulness may be from the upper border of the third down to the eighth rib, and from an inch to the right of the sternum to the anterior axillary line. It may also be detected in the left back. Emphysema and hepatization of the anterior pulmonary border may mask and mitigate this sign, and give rise to more or less fallacy; but in such cases a careful survey of co-existent symptoms and other physical signs will generally point to a correct diagnosis.

Auscultation discovers the systolic sound as indicative of augmented power, and is confirmatory of other conditions, which distinguish this affection. It is generally less clear and defined; it is prolonged and muffled consequent upon the muscular sound being excessively pronounced, and covering that of the auriculo-ventricular valves. The prolongation is in proportion to the degree of hypertrophy. The sound is intensified at the base and ensiform cartilages. When there is much hypertrophy the first sound may acquire a metallic character. The post-systolic silence is abbreviated. During palpitation it may be clear and ringing. The second sound is loud. Simple hypertrophy does not give rise to murmurs. When there is dilatation with hypertrophy the first sound is more audible and distinct, and the second sound is louder. The *coup de marteau* is represented.

Right Ventricle.—Hypertrophy of the right ventricle is always associated with dilatation, and there is also very generally left side disease. Such is not, however, uniformly the case, as the lesion of this compartment may be the sequent of some pulmonary affection and of obstruction in the pulmonary artery. When the respiratory function is overtaxed, as in violent and continuous muscular exertion, it is apt to become large. Dilatation is the distinguishing characteristic of the right, as hypertrophy is of the left heart.

There is bulging of the left costal and ensiform cartilages. Irregular pulsation (consequent on regurgitation through the tricuspid orifice) is a notable symptom. There is a greater tendency to facial lividity than in thickening of the left chamber. *Inspection* witnesses the beatings of the organ more diffused, and such motion is observable abnormally towards the right; it may exceed the ensiform cartilage, and it occupies a more downward position than other kinds of enlargement.

Palpation discovers the impulse over the lower part of the sternum. It feels distinct, immediately under the hand, and extends in the line of the third, fourth, and fifth right costal

cartilages. It is quicker and has not the peculiar heaving before spoken of as so characteristic of left hypertrophy. Epigastric pulsation often obtains in marked manner. The liver pulsation, which may be felt, is said to be caused by venous regurgitation, or right systolic action being extended through the diaphragm.

On *percussion* the inferior line of dulness extends lower down and towards the right. It may occasionally be traced to an inch, or an inch and a-half beyond the right sternal edge. When thus in extreme degree it is presumptive that the right auricle is also enlarged. The dulness may become lost in the line of dulness caused by the left lobe of the liver. The absence of left dulness and the other more positive signs of left hypertrophy will aid in diagnosis.

The *Auscultatory* signs are characteristic of the change. The first sound is more distinct than natural, and as if superficial. The action of the tricuspid and pulmonary valves is louder. Reduplication of the second sound is not uncommon.

The radial pulse is hardly, or it may be not at all, affected. In this respect there is indicated a marked difference from what obtains in hypertrophy of the left compartment. There may be irregular action heard by the stethoscope with a perfectly regular pulse. This natural condition of the radial pulse, with other positive signs and symptoms, is an important clinical fact. The pulmonary artery, being subject to excessive force and tension, is liable to take on disease; and the atheromatous condition is not unfrequently discovered. Dyspnoea and emphysema are generally observed; and œdema of the lung substance, hyperæmia of the bronchial membrane, hæmoptysis, and pulmonary apoplexy patches. And passive forms of pneumonia, and sometimes an anasarctous condition of the neck and face with facial lividity are pathologic states, which are distinguishing and significant symptoms of enlargement of the right heart.

The Auricles.—It is always difficult to speak absolutely of the morbid changes of the auricles during life. They are never hypertrophied without being dilated. And such states are uniformly connected with lesion of the auriculo-ventricular valves. *Hypertrophy of the Left Auricle* gives rise to dulness extending up to the second intercostal space. There is then disease of the mitral orifice. *Hypertrophy of the Right Auricle* produces dulness at the third and fourth interspaces at the right sternal edge. Irregular pulsation is a marked characteristic. Enlargement of the cavity and thickening of its walls are hardly ever co-existent with a natural condition of the right ventricle.

Diagnosis.—Emphysema of the left lung by interposing between the heart and chest-wall may greatly mask hypertrophy. Augmented force of impulse, a slow, deliberate, heaving systolic action, displacement of the apex-beat, and extended dulness are the chief physical signs. The organ comes in approximation with the left side over a larger area. In young and in thin people the same

is apparent, but in these the accompanying conditions will be our guide; there may in such be antro-posterior narrowness, and the seemingly greater impulse may depend upon the thinness of the chest-wall: again in these instances the quick, clear, sharp heart-stroke, and its subsidence into calmer action after exertion, would be the distinction. There is no extended dulness as in hypertrophy.

In *left hypertrophy* there is a large, strong, often bounding pulse, the carotids and superficial arteries are seen to pulsate; the face is apt to be flushed, the patient complains of headaches, giddiness, or throbbing in the head, and hæmoptysis and epistaxis are not uncommon. The apex-beat is lower down, and the impulse may be felt over the fifth, sixth, seventh, and eighth ribs.

In *right hypertrophy* there is increase of impulse which is felt under the lower part of the sternum, and it may be communicated to the left lobe of the liver; the apex-beat is lower and outwards. The dull area is extended downwards, and is wider than natural. The first sound is slower and superficial; the second sound is intensified, more especially over the pulmonary artery. The radial pulse is not tense and forcible as in thickening of the left chamber; facial lividity, dyspnœa, cough, mucous and sanguinolent expectoration, attacks of hæmoptysis, and jugular pulsation, are the chief diagnostic indications.

Dilatation differs from hypertrophy by the dulness of the former being more diffused. The impulse is feebler, and the apex-beat may be hardly recognised, or it may be entirely wanting. When the organ is merely dilated its action is irregular and intermittent, and a soft, compressible, small pulse, chilliness of the hands and feet and the general surface, and a leaden shade of countenance, are the accompaniments. In *pericardial effusion* the signs and symptoms of a foregoing and an acute disease would tell of the nature of the malady. In this affection the lines of dulness, if demarcated, give a pyramidal figure, the apex pointing upwards, and dyspnœa, sharp, lancinating pains, and a feeling of suffocation often obtain. *Pulmonary consolidation*, and the far more extensive dulness of *pleuritic effusion*, could hardly be mistaken for it. In *aneurism* the auscultatory signs would point to the correct diagnosis.

Prognosis.—Simple, uncomplicated hypertrophy is conservative and protective from worse events. Walshe thinks that in such form it is never fatal. Patients thus affected may live to advanced age. In the young, in athletes, and in those who are subjected to great muscular efforts, on the cause being removed, the prognosis is *favourable*. Relatively, according to the degree of lesion of the valves and orifices, pericardial adhesion, to the amount of co-existent pulmonary disease, to the age and the condition of debility, it will be *unfavourable*. In consecutive degeneration of the connective tissue in the fatty changes of the walls, in decay of the arterial coats, in dilatation, and in Bright's disease, the prognosis becomes still more *unfavourable*.

Treatment.—The treatment of hypertrophy, as once pursued by the followers of Albertini and Valsalva, has been abandoned. The modern doctrines of a more fundamental and correcter pathology have shown such views to be quite untenable. It has in this article been insisted upon that hypertrophy is a conservative change, and protective from worse results. To lessen or remove the primary cause should be the object of our first attempt. It will decline if the condition by which it is produced can be mitigated. To merely aim at decreasing the nutrition and volume of the organ is not sufficient; indeed, such attempt alone endeavoured to be accomplished might be absolutely injurious. To merely lower the nutritive function and subdue the organ's activity and force of propulsion might greatly favour another and worse evil,—that of dilatation. Nature has strengthened and augmented the viscus for a purpose—to overcome obstruction, and it is the latter state that is mainly to be considered.

No particular remedy or any class of drugs will arrest the morbid growth or enlargement of the heart. General principles, which have a reference to facts, causes, and those other accompanying morbid changes are of essential importance in therapeutical efforts. It is always well to attend sedulously to the digestive organs, so that there shall be no flatulency to distend the stomach, and therefore in secondary manner to embarrass the central organs of circulation. Mild aperients of the saline and aloetic preparations should be ordered. When there is a dropsical tendency, and without renal complication, diuretics should be prescribed. When there is great excess of action direct cardiac sedatives are indicated; such as digitalis, hydrocyanic acid, conium, and belladonna are of essential service. When there is dilatation with hypertrophy iron and digitalis are of signal use, and our chief agents.

All mental and bodily exertion, which excites the circulation, must be scrupulously avoided. To render the heart quiescent and to favour the easier passage of the blood through its cavities and orifices constitute the obvious and rational treatment. All alcoholic stimulants should be rigorously interdicted, and no more wine allowed than such as might seem to benefit digestion. A carefully selected diet is needful, and nitrogenous principles of food are to be commended in the generality of cases.*

* This article, which was written for "Quain's Dictionary of Medicine," has been republished in this work by the kind permission of Messrs. Longman & Co.

II.

DISEASES OF THE SPLEEN.

DISEASES of the Spleen most frequently prevail in marshy districts and tropical countries, and as the complication of intermittent and remittent fever. Acute splenitis implies inflammation of the serous investment, which sometimes extends from the parenchyma, but which, in the majority of instances, occurs by continuity, when other internal parts are inflamed. Inflammation of the Spleen, when not referrible to wounds or external violence, is never a primary but always a secondary complaint. The most common affection of this organ is that of sub-acute or congestive splenitis. The viscus may be very large and turgid without being inflamed, and such state sometimes comes on with much suddenness. The parenchyma is far less prone to acute inflammation than the envelopes. The organ may be the seat of great pain, constituting splenalgia, or dolor lateris, when quite uninflamed. It passes into suppuration, and abscesses of various sizes are formed in its structure. It is often greatly enlarged in European children who are resident in the tropics. In leucocythæmia the organ attains very great magnitude. In dyscrasia, and especially in that degradation of the circulatory fluids which obtains in periodic, continued, malignant, and exanthematous fevers, the Spleen undergoes marked appearances of organic change. Morbid anatomy discovers, as in the other viscera, the ordinary inflammatory products, hypertrophy, atrophy, induration, softening, and gangrene. On its tunics are sometimes witnessed fibrinous, cartilaginous, and ossific conversions. In its substance are occasionally seen fatty degeneration, amyloid deposition, hydatids, cysts, and the tuberculous, cancerous, osseous, and calcareous changes.

GENERAL TERMINOLOGY.—Σπλήν (Gr.); Splen (Lat.); Rate (Fr); Milz (Ger.); Splenitis (various authors); Lienis inflammatio (Boerhaave and Van Swieten); Splenitis phlegmonodea (Sauvages and De Haen); Splenalgia suppuratoria (Sauvages); Empresma splenitis (Good); Splenitis peritonealis acuta (Craigie); Splenite (Fr.); Entzündung der Milz (Ger.). The non-inflammatory affections have been variously named Congestion, Turgescence, and Hyperæmia of the Spleen. And when pain has been the chief characteristic, Splenalgia, Dolor lateris, Splenis Dolor, and Splenic Pain, are terms which have been commonly employed. In certain districts it is usual to speak of its chronic enlargement in the vernacular, as Disease of the Milt, or the Ague Cake.

There is scarcely any part of the human body of which more has been written and respecting which more theories have been propounded than the Spleen. Its doubtful purpose in the economy has evidently constituted the main cause of the great consideration which has been bestowed upon it, and of the numerous and varied hypotheses which from distant ages have been enunciated. The most ancient account which we have of this viscus and the diseases to which it is liable is to be found in those writings which are attributed to Hippocrates, and where the organ is so prominently mentioned in relation to the well-known doctrine of the four humours. When Haller began to write on this subject, he premised his observations by saying that he was plunging into the region of mere conjecture, darker than in the case of any other viscus. Though much respecting its use has in recent times been made out, still there remains, as relates more especially to its functions, a good deal that is speculative and not fully accepted, and in the commencement of this article the writer cannot feel unimpressed with the figurative but emphatic declaration of Haller. The knowledge which we have of its office, and the pathological changes to which it is subject, is by no means so clear and absolute as our knowledge of most of the other internal parts. It would be out of place here to give in any lengthened detail the doctrines which have from time to time been put forth and successively fallen into oblivion, but to some of these a passing reference may be made. In remote ages it was remarked that an enlargement of the Spleen was generally accompanied by an emaciated condition of the body. In the Hippocratic collection, it says "those persons whose Spleen is large have their body meagre." The same idea is to be found in the *Timæus* of Plato, and which, it is related, gave rise to the well-known comparison of Trajan, who said that the Imperial treasury was like the Spleen, because when that was rich the people were impoverished. Aristotle believed the Spleen to assist the liver in digestion, that it attracts from the stomach superfluous and excrementitious humours (*ἰχμᾶδας τὰς περισσᾶς*), and corrects them. Plato supposed that its office is to relieve the liver when distended. Galen, whose opinions were evidently more widely accepted, and longer assented to than any of the opinions which before his time had been advanced, imagined that the humour called black-bile (*χολή μέλαινα*) is secreted by the Spleen, in the same way as the yellow bile (*χολή ξανθή*) is secreted by the liver. The Arabian physicians and the few philosophers who, in the sparsely scattered seats of learning, lived in the dark ages, were evidently contented with the Galenic theory. Aretæus had arrived at the idea that the spleen is nourished by black-blood (*μέλαινα χολή*), and hence the terms *melancholy* and *splenetic*. Orbasius, Trallanus, Paulus Ægineta, Actuarius, Haly Abbas, Protospatharius, and Meletius held to the views of Galen. Erasistratus deemed it as being of no real use in the body. Avicenna conceived that, being an organ so surcharged with blood, warmth is imparted

to the stomach, and thus the process of digestion becomes aided; and certain of the Arabic writers entertained the chimerical notion that its office is to cool and refresh the heart. Such were the crude conjectures and vaguely defined doctrines which have been transmitted from ancient times. They were the mere expressions of speculation and the flights of fancy, without being based upon inductive reasoning, and having little or no foundation in experiment. With certain modifications they were held until the beginning of the sixteenth century, that epoch which is regarded as the period of the revival of letters and philosophy, when the works of the ancients became more carefully and more generally studied, and their opinions were subjected to closer examination and nicer criticism. Some of the anatomists who then flourished looked upon the *vasa brevia* as ducts passing from the stomach. Franciscus Ulmus imagined the Spleen to be possessed of certain properties necessary for the preparation of the blood for the heart and arteries, and Tel Plater also was of opinion that it had the function of elaborating the blood, rather than the functions of attracting the melancholic humour (Gray.) Other of those remote writers, as St. Ambrose, modified the Galenic notions, and contended that the Spleen draws away the useless part of the aliment, and after its retention for a time transfers the purified and subtle remainder through the liver to the blood. Less antiquated hypotheses than those of the Grecian and Roman philosophers are to be found in the works of Schoolmen who flourished in mediæval times; but they likewise lay claim to no serious regard, as their theories, like the theories of those who had long preceded them, were but the chimeras of caprice and delusive imaginings, devoid of proof, and readily to be contradicted by experiment. Some thought the organ secreted a fluid which passed into the stomach, certain that it elaborated a product necessary to the nervous system, and others that it produced a sort of chyle.

Coming down to more modern times, and even to recent periods, when physiological problems have been cautiously tried by, and only found an accepted solution in accurate and repeated experiments, still the entire uses of the Spleen have not been finally determined, and many distinguished names have been the adherents of opposing views. Müller thought its importance in the economy less than many other authors supposed, and averred it fallacious to maintain that it is essentially connected with the function of the liver. Mead and Meyer deemed it necessary to digestion, Tiedemann and Gmelin were convinced that it generates a certain kind of lymph which serves to form the blood-globules, and Kölliker, Funke, and Billroth incline to the last-named supposition; Dollinger regarded it as a sort of symmetrical appendage to the liver; Lieutaud and Moreschi looked upon it as a reservoir to accommodate the blood of the stomach when that organ becomes distended with food, and when more blood is sent to it during the process of digestion; Sir Everard

Home revived the Hippocratic theory of the Spleen receiving fluid from the cardiac end of the stomach, to be thence carried into the circulation; and Ecker and Beclard say that one of its chief uses is for the solution and destruction of the blood-globules. Microscopical anatomists, and especially those of Germany, first paved the way to more precise and definite conclusions relative to this organ, and of late years pathologists have been induced to study its varied diseases with more interest than was formerly the case. If reference be made to systematic writers on this subject, it will be seen that there is not that satisfaction, not that conviction, expressed which is to be observed in the articles treating on the ailments incident to the other viscera. The difficulties which have beset authors in their descriptions of the Spleen and its maladies have arisen from a variety of causes, and not only from a want of knowledge of its functions, and amongst the chief of which causes may be instanced its peculiar situation in the abdomen, being deep in the left hypochondrium and surrounded by organs which are regarded as more prone to disease, and with whose symptomatology physicians have been long more familiar; by its being hidden as it were by the thoracic wall; by its capability of sudden and even great distension without giving rise to any serious inconvenience in the system; by its comparatively simple action; by its low degree of sensibility; by its diseases not being endemic in this as they are in malarious countries; and by there being an erroneous impression that splenic complaints are by no means common. From what, therefore, has now been said there are difficulties in the diagnosis of its lesions which do not obtain with many other organs. Being a ductless gland, and not influencing any secretion or excretion, nor giving off any secreted product that can be submitted to examination and experiment, its morbid phenomena cannot be studied and comprehended with the same certitude and exactness with which we can investigate the diseases of the liver and the kidneys. The vascular glands, of which the spleen may be regarded as the prototype, though they differ from the secernent glands, are importantly connected with the process of sanguification. By some modified mode of secretion they abstract certain materials from the blood, act upon such materials, and then restore them to the circulation without being eliminated by any duct or outlet from the organ. There is then great analogy in function between the blood or ductless glands and the secreting glands. Between nutrition and secretion there is great analogy, and the processes proper to vascular glands are partly nutritive and partly secretive. That other organs can vicariously assume its office in the economy, and that it is not absolutely essential to health or even to life, is evident, because it has been extirpated in the human subject and the patient has lived thirteen-and-a-half years and enjoyed health. It has been found so exceedingly small as to be quite in a rudimentary state, and it has been said to be altogether wanting. Even in health, as Bright observes, its volume, consistence, and position may vary from so many

causes that it is not subject to the same rules and precision in the investigation of its maladies which can be brought to bear in other of the viscera. The advances which microscopical anatomy, experimental physiology, and animal chemistry have latterly made, and are still making, promise much in clearing up certain mysteries which yet remain, as I have already remarked, with regard to the Spleen. It is becoming more admitted, and it is certainly incontestable, that even in the British Isles, where the endemic element in the causation of its morbid affections obtains to an infinitely less extent than in former times, it is more frequently the seat of diseased action than the older authors were led to suppose. The increased attention which clinical teachers have recently given to physical diagnosis in all forms of abdominal complaints has contributed more and will contribute still more to the comparative accuracy with which we can judge of its lesions.

It may here be remarked to the reader that a knowledge of its position in the abdomen, of its anatomical and microscopic structure, and, so far as we can speak, of its functions, is essential to a right comprehension of its ailments. Hence, in attempting to treat of this subject in any systematic work on medicine, such must needs be done in a somewhat exceptional manner. It must be remembered that in health the Spleen cannot be felt. If it can be felt and is not really diseased, it is then displaced. Lying obliquely in the left hypochondrium and in intimate relation with the diaphragm, and by which it is separated from the ninth, tenth, and eleventh ribs, its situation necessarily varies with the act of respiration—a fact never to be forgotten in diagnosis. In the deepest expiration its upper end will ascend to the lower edge of the eighth rib; and in the deepest inspiration, when the organ is normal in volume, it never descends below the cartilaginous margin of the chest. It is attached to the stomach and the pancreas, and at its lower angle it touches the left kidney. Its size varies more than that of any other organ in the body, except the uterus and the ovaries. The greatest weight of anatomical evidence goes to prove that this viscus is a single organ in the body. In its earliest development it appears in the median line. Dr. Embleton thus expresses himself on this point: “The Spleen originates in the median line of the body, is gradually carried thence to the left hypochondrium, and it ought to be regarded as originally median and not belonging to the left side more than the right.” This writer then cites a number of ancient and modern authorities who look upon it as a single organ.

The *peculiar structure* of the Spleen is not only a circumstance carrying with it much physiological interest, but it has a direct and an important pathological significance. Its distensile qualities intimately concern its lesions; indeed this property constitutes one of the main causes of its most frequent morbid changes. Its capsule is of fibrous structure and invested by the peritoneum, and this tunica propria, being of elastic tissue, enables it to yield to the greater or

less distension of its vessels. It everywhere encloses the parenchyma. From the inner surface of the elastic tunic sheaths are formed for the vessels and their ramifications, and from these sheaths fibrous septa and bands (trabeculæ) are given off innumerable, and these form cells (loculi) into which the blood is effused. This fibrous coat is composed of white and yellow fibres, the first named consisting of parallel bands and the last mentioned being united in a densely reticulated arrangement. According to Köl liker, the trabecular tissue, in its elementary essentials, closely corresponds with the fibrous capsule, since it exhibits both white and yellow fibres; and he considers them as being muscular, thus on this point agreeing with Malpighi and others who had persistently regarded the partitions of the spleen as being muscular. One of the most recent writers (Marshall), on this particular question entertaining the same opinion, says: "The proper coat, the sheaths of the vessels, and the trabeculæ consist of white fibrous and areolar tissues, mixed with elastic fibres, and contain, especially in animals, pale fusiform, unstriped muscular fibre-cells." The splenic capsule is very yielding, and the walls of its vessels are unusually thin. This slight elasticity accounts for the slow disappearance of the organ's distension when from any cause it has become surcharged with blood. The mode in which infected blood still further diminishes its distensile properties is mainly, as it would seem from the experiments of Jaschkowitz, by a greater or less degree of paralysis induced in the branches of the sympathetic which go to this viscus. There is no doubt, however, that mere and continued mechanical pressure exerts its effects upon these nerves.

There is no organ which receives a greater number of blood-vessels in proportion to its size than the Spleen, and its extreme vascularity has always been dwelt upon by anatomists as one of its distinguishing features; and this fact, as Bichat remarks, becomes more worthy of notice because it secretes no fluid. The splenic artery, which is the largest branch of the cœlac axis, and which near the organ breaks up dichotomously into five or six branches named the *rami splenici*, is a very large blood-vessel in proportion to the organ it supplies. When these rami enter at the hilus, they divide into innumerable subdivisions, nor do they anastomose, and they soon divide into a coarse capillary network, and this retiform structure quickly ends in minute veins. The splenic vein is of very considerable calibre as compared with the artery and the volume of the viscus. According to Home, Piesker, and others, it is five or six times larger than the artery, and its coats are very thick and it has no valves. It constitutes the way of return, by many tributaries, for a large volume of blood, as it takes the venous blood from the pancreas, duodenum, the greater part of the stomach, and sometimes the left colon and part of the rectum.

The red splenic pulp or parenchyma occupies the spaces between the trabeculæ and exterior of the vessels. It is a soft, bluish-brownish

mass, which becomes redder when exposed to the atmospheric air. It consists of a colourless, granular parenchyma, mixed with coloured cells and red blood-corpuscles, the colourless portions being composed of variously shaped nucleated cells and a finely granular plasma, and which, it has been said, resembles the ultimate materials entering into the formation of the solitary and agminated glands of the intestines. Physiologists regard the coloured cells as altered red blood-corpuscles and as being peculiar to the spleen. Some are smaller than the ordinary blood-globules, others are yellow, brown, or black; and their pigments may be seen in depositions which are crystalline or granular. In the spleen-pulp are the Malpighian corpuscles, which are small white, soft bodies, measuring from the sixth to the third of a line in diameter; they are attached to the small arteries and trabeculæ, and arranged in sessile manner like buds on a twig, but they have no communication with the arteries, and their contents are granular and nucleated cell elements. They are so numerous that they are said to form one-fifth or one-sixth of the splenic pulp. It has been noticed that they are absent in the human Spleen after protracted disease and in starved animals, but very observable in health and when the body had been highly nourished.

The nerves of the Spleen are derived from the solar plexus, and they form an interlacement called the splenic plexus. The nerves are relatively small as the vessels are relatively large, a fact acknowledged from the time of Aretæus, and hence the little sensibility with which this internal part is endowed. The nervous filaments follow the course of, and may be traced in, the minute arterial branches which go to the Malpighian corpuscles, and pass into the pulp. Embleton believed the gland may receive nerve-twigs from each pneumogastric and the sympathetic ganglia on each side; such anatomical arrangement had not, however, been fully determined when he wrote. M. Picard says this organ receives motor nerves, as evinced by the splenic nerves being irritated on the peripheral side its contraction is produced; and irritation of the central ends of the same nerves gives pain. From experiments he determined its contractile power by reflex action. This authority concludes that the contraction in normal life results from a sensitive action which reaches centres, following the trunks of the two pneumogastric nerves, whilst the centrifugal action which follows it passes along the spinal cord and the splanchnic nerves. He could not, however, explain physiologically the mode of its dilatation.

During the process of digestion the spleen is temporarily enlarged, which can be understood when it is considered that the vasa brevia are branches of the splenic artery which inosculate with the gastric artery and the gastro-epiploica sinistra. When the stomach is distended with food, more blood is sent to those vascular connections, and the Spleen by its accommodating structure receives any undue supply of blood which during the activity of the digestive

functions is determined to these parts. When there is loss in the force of cardiac action, its congestion is a consequence; and when the volume of the circulation is diminished by hæmorrhage, or when irritation in the gastro-intestinal membrane is followed by serous diarrhœa, it can at once be comprehended how this viscus will be reduced in size. Physiological experiments have gone to confirm the opinion long ago advanced by Hewson that this gland is engaged in the formation of the germs of the blood-corpuscles. It is probable, though not absolutely certain, that it is also engaged in their disintegration. M. Picard has recently demonstrated that the organ contains a proportion of iron four times greater than that of the blood itself. It is by some confidently stated that in diseases of this organ, pigment masses, the débris of broken-up blood-cells, have been discovered. Kölliker not only regards its functions as concerned in the renewal of the blood, but he believes with the ancients in the secretion of bile also. This doctrine is, however, a mere hypothesis. That the Spleen acts as a diverticulum to the visceral circulation is much more certain than anything we know of its other uses, and that it is destined to a more exalted office than that of being a sort of mechanical contrivance, or vascular reservoir, is now sufficiently conclusive, for had such been its mere purpose, there would then, as it has been remarked, have been no need for its peculiar parenchyma, and a simple plexus of blood-vessels would have subserved to such end; and towards the termination of the digestive act, not only is its entire volume increased but there is also an absolute augmentation of the spleen pulp, and, too, of the Malpighian bodies. The blood cells of this organ are of varied colour, and it is probable they are not only there disintegrated, but it has been conjectured that materials from the old red corpuscles, such as the pigments, may be again used in the germs which go to constitute the new corpuscles. It attains its largest dimensions at the termination of chymification, and if no food for some time be taken, it then becomes gradually reduced in volume. The resilience of its elastic tissues renders it particularly adapted for taking in a surcharge of fluid during the torpor of the vascular system which results from digestion. In disease its peculiar capabilities are made subservient to the altered requirements of the circulation. In hepatic affections, more particularly in cirrhosis, it can be comprehended, from the foregoing physiological facts, how frequently the Spleen is involved. The blood of the splenic veins must pass through the liver, and if there be obstruction in the last-named organ, a backward retardation in the circulation of the Spleen must necessarily be produced. In chronic cardiac disease, and especially when the right side of the heart is enlarged, this organ from venous obstruction becomes tumid. In children it should be borne in mind that the Spleen, like the liver, is relatively large. Gray considers its office is to balance the quantity as well as the quality of the blood, which it is able to do by its connection with that part of the vascular system which is

concerned in introducing new materials into the circulation. Its contraction and relaxation, it is possible, may be influenced by the sympathetic system, because electrical currents, as it has been shown by experiment, cause the organ to contract. The views of Carpenter relative to the use of the Spleen seem so apt that they may here not inappropriately be quoted. "We are inclined to believe," says this eminent authority, "that the office of the *colourless* parenchyma of the Spleen is not only to serve as a storehouse for the surplus albumen that finds its way into the circulation on the completion of the digestive process, but also to excite an *assimilating* action upon it, whereby it is rendered more fit for the nutrition of the tissues, and of this assimilating action we deem the generation of fibrin to be one of the results. And if it be true, as we have elsewhere suggested, that one special function of the red corpuscles is to assimilate or prepare that peculiar combination of materials which is required for the nutrition of the nervo-muscular apparatus, the disintegration of these corpuscles in the splenic parenchyma may answer the twofold purpose of regulating their total proportion in the mass of the blood, and of diffusing, through the liquor sanguinis, the materials which the nerves and muscular tissues are to draw from it for their own development." Maggiorani, from experiments on the lower animals, concluded that the spleen has the double function of presiding over a metamorphosis of organic elements and of accumulating iron for hæmatin. And Jaschkowitz found that section of its nerves caused it to produce an increased flow of blood, and an increase of hæmatin-pigment. If we acknowledge such as being certain of the functions of the Spleen, much light is necessarily thrown upon those affections with which its more manifest diseases are associated.

The relation which subsists between the Spleen and the lymphatic glands, which was first pointed out by Hodgkin, and the discovery of an excess of white corpuscles in the blood in the form of its chronic disease, are facts which have added very much to our knowledge of its functions, and will doubtless be followed by still more precise information. It has also been stated that there is some relation between the spleen and Peyer's patches, and it is a point of considerable interest, as Sir William Jenner observes, that the Spleen, the lymphatic glands, and Peyer's patches all suffer involution at the same period of life—about fifty. This writer also remarks that at that time the Spleen becomes less, the lymphatic glands waste, and Peyer's patches smooth down; and that it is at this period of life that the diseases, and especially enteric fever, in which these parts are involved, cease to be common.

GENERAL ETIOLOGY.—Diseases of the Spleen are limited to no particular period of life; we see them in infancy, in middle age, and in advanced years; and males, from their more frequent out-of-door occupations and consequently greater exposure to external influences, and their less temperate habits, are more liable to them

than females. With respect to the causes, none is more prolific than that which is endemic; and to malarial agency, splenic lesion, and those affections with which it is so commonly allied, have, from the remote times of Hippocrates, Livy, Tacitus, and Plutarch, down to our own, very consentaneously been attributed. In such of those writings of the ancients which have descended to us, and in which are discovered descriptions of splenic complaints, the causation now instanced is prominently mentioned. During many subsequent centuries, when learning and philosophy were confined to the few, and when popular opinion was tintured by and received its bias from the schoolmen, the same doctrine, with other and far less correct notions, was maintained. The physicians in mediæval times concurred in these views. Modern authorities, more especially those who have written on the diseases of tropical countries, and such as are met with in the vast range of our colonial dependencies, have abundantly pointed out the malarial origin of the majority of the ailments incidental to this viscus. In the fenny counties of England, more especially those of Cambridge, Lincoln, and Essex, from time immemorial to that in which we live, splenic complaints have prevailed. In the East and West Indies; in the Southern States of America, and particularly in the extensive river plains of that continent; in China, Canada, and in Australia; in Hungary, in Holland, in Italy, and in those countries bordering on the shores of the Mediterranean, this etiological influence is so well known as to need not more than a passing reference. In tropical countries where great heat and moisture prevail, or those parts formed by the deltas of great rivers where the soil is composed of alluvial and vegetable remains, and where paludal exhalations are given off, the causation is rife. Inundations from the sea, and great inland floods, or where sea and fresh-water for a time stagnate and then disappear, render low grounds extremely insalubrious, and there the affections considered are in great degree produced. In Holland, where these inundations have so often occurred, the effects described have as the rule always followed. In that country, after the partial inundations by the sea in some places in the winter of 1825 and 1826, during the following summer, when the sun's rays dried up the earth which had been so long saturated the decomposition of organic matters ensued, and the concentrated effluvia were succeeded by fevers of a remittent type and splenic complications. From the accounts which have been given of the endemic diseases in Hungary, in the summer and autumn, when the hot weather has promoted the decomposition of organic materials, fevers of an adynamic type with Spleen affection very commonly prevail. In former times, when in our own country vast tracts of forest and marsh land lay in a state of nature, when the kingdom was thinly populated, and before reclamation and drainage became so general, the maladies incident to this organ were often observed. Again, paradoxical as it may appear, cultivation and drainage may have a deleterious effect. It has been repeatedly

affirmed that in the tropics and in our colonies, where the ground was thick with trees and overgrown with rank vegetation, such places were more healthy than immediately subsequent to the efforts of the cultivator. The trees and undergrowth keep off the sun's rays, but when they are removed, and the soil becomes first subjected to heat, miasms are then far more abundantly exhaled, and it requires a succession of seasons—sometimes many years—before the new ground has fully given off the poisonous gases which under such circumstances had been generated. Dr. Rush has recorded the kind of effects now spoken of which took place after the clearings in the primæval forests of Pennsylvania, and in the works of Montfalcon and Bailly similar testimony is given. Sometimes higher situations are more dangerous to live in than the situations beneath them, because the miasms may be wafted away by prevalent winds, and the emanations may be concentrated in the vapours which rise from the valleys, and are carried upwards to be intercepted by acclivities and neighbouring eminences. This fact has been long observed, and the explanation now advanced has been generally acknowledged. The various records of our military expeditions, and the statements made by medical men who have resided in our colonies, abundantly attest the correctness of these remarks. These authorities also have told us that the new residents in such places are far more prone to malarious attacks than those who have in some measure become acclimatised. Great and prolonged muscular exertions, which not only determine the blood to the internal organs, but absolutely produce changes in the constitution of the fluid, such as protracted and fatiguing marches and the laborious operations of active service, together with great privations, bad food, the use of stagnant water and water which has run through marshy districts, sleeping in damp situations or in the open air without sufficient covering, and mental depression, produce splenic complaints. Blane and Dawson, in their respective accounts of the Walcheren diseases, give prominence to such causes. Sudden transitions of temperature which occur in those climates where hot days are succeeded by cold nights, and where periodic rains produce a rapid fall in the thermometer, have been mentioned by various writers. The blood is then quickly determined from the surface to the visceral organs, and from what has already been said of the accommodative and distensile qualities of the Spleen, it can be comprehended how such abrupt repletion of its vessels must, if such surcharges were continuously repeated, tend to the permanent enlargement and structural alteration of the viscus. Periodic fevers thus produce its hypertrophy. Sir J. Ranald Martin thus expresses himself on the point now considered: "The most ordinary cause of splenic congestion," says this writer, "whether active or passive, will always be found in the malarious countries of the East—remittent and intermittent—which, for longer or shorter periods, and by the recurrence of their cold or congestive stages for months or years together, disturb or eventually destroy the balance of the

abdominal circulation, and with it the integrity of the abdominal functions. When to these morbid conditions we add destitution, the absence of comfort in food and clothing, the residence in low, cold, and damp localities, mental depression, those causes, in short, which contaminate the blood, and determine its flow into the abdominal organs: all these causes will powerfully tend to the production of splenic disease.**

Morbid changes in the blood itself, effected in a more direct and in an immediate manner, are to be noticed; as the absorption of noxious effluvia, which at once operate upon the circulatory functions and are followed by visceral turgescence; the specific poisons of the various forms of fever, and the retention of effete matters from the imperfect action of the depurating organs, and especially of the kidneys. In those contaminations of the blood associated with pyæmia, septicæmia, or ichoræmia, the Spleen not infrequently assumes the purulent condition. There is no doubt that as the common event this gland becomes tumid where there is metastatic infarction and when infectious thrombi circulate in the blood. The loss of nervous power consequent upon some depressive agency affecting the great nervous centres which diminish vital cohesion, and those cachexial changes which proclaim debility, are also to be enumerated.

Twining speaks of an assemblage of symptoms, all caused by debilitating influences and tending to asthenia, which obtain notably in Bengal, affecting not only the European residents but also the native population, and which he calls the endemic cachexia of the tropics, as being a condition markedly associated with splenic complaints. In the complications and sequelæ of intermittent fever, this organ is very commonly attacked. Pemberton says it is most frequently affected by quartans. In the continued fevers, more especially in those instances in which there are hepatic symptoms and where the adynamic type is assumed, its disease is very commonly noticed. Tweedie speaks of often having found it soft and enlarged. Barrullian in 1,202 cases of typhus discerned the Spleen diseased in 126 instances, or in 10·48 per cent. Louis states that in forty-six inspections of enteric fever, in only four cases was it healthy. Murchison also gives testimony of its frequent affection in this form of fever. Birch-Hirschfeld says that in enteric fever Spleen tumour is generally most marked in the second or third week. In relapsing fever Cormack says it was congestively enlarged in a great number of cases. Warburton Begbie, in his description of this fever, asserts that the organ now spoken of is always altered. In an account of relapsing fever which I published in 1847 I then said the Spleen was well-nigh always diseased. In the Russian epidemic of relapsing fever in 1864-65, as described by Tillner, Doubownitski, and Bernstein, it was large. Wunderlich and Steffen thus also speak of it. In the exanthems it is not uncommonly found morbid. In the epidemic of cerebro-spinal-meningitis, which occurred in Leipsic 1864-65, and

* "Tropical Climates," second edition, p. 501-2.

was recorded by Wunderlich, the Spleen was found large, with a tendency to hæmorrhage in such cases as were distinguished by great exhaustion, palpitation and vomiting.

That diseases of the liver are often followed by lesions of this organ is an acknowledged fact. The splenic vein is one of the great formative trunks of the portal vein, and thus when the circulation of the liver is impeded, there is very commonly, but not uniformly, congestion of the Spleen. Murchison says this result is less frequent than might be imagined; and when the circulation of the liver is mechanically obstructed, he believes the Spleen is rendered large in about one-half of the cases. He believes that the absence of enlargement is consequent on the fibrous thickening or calcification of the capsule, preventing vascular dilatation, or on an excessive drain from the gastro-intestinal mucous membrane by diarrhœa or hæmorrhage. The portal system being destitute of valves, the splenic vein has consequently communication with the whole of the portal system. In hepatic disease, and especially when the action of the liver becomes enfeebled, it can readily be comprehended how in a conservative manner the blood can be diverted into the spleen. Of cirrhosis splenic disease is the frequent accompaniment. An undue afflux of blood is sent to and retained in this multilocular reservoir, and such surcharge of fluid is succeeded by its enlargement. Rheumatic endocarditis and organic diseases of the heart, especially of the mitral and tricuspid valves, and of the great vessels, are also to be instanced. According to Birch-Hirschfeld of Dresden, there may be considerable enlargement from uncompensated mitral insufficiency, but as the rule there is no notable splenic increase when there is merely incompetency of the aortic valves. When in acute rheumatism fibrinous depositions have become attached to the valvular margins, and are subsequently disintegrated and carried into the current of the circulation, these broken-up pieces of fibrin are sometimes, in the Spleen as in other organs, arrested in the minute vessels, and by giving rise to capillary embolism set up inflammation. It is now known as one of the advances in modern pathology, though perhaps of less frequent occurrence, that when the edges of the cardiac valves have been rendered rough by the heterologous transformations of age, and when deposits of fibrine from the blood-stream have taken place upon the margins of the valves, some fibrinous pieces may be washed off, and by being transferred to the Spleen, as they are transferred to the brain, the liver, and the kidneys, and perhaps to other viscera, may produce capillary embolism precisely resembling that which occurs in rheumatic carditis. And this order of sequences is doubtless an etiological explanation of those inflammatory patches and purulent collections of smaller or larger extent which were by Louis, Abercrombie, Craigie, and others considered as examples of idiopathic inflammation, and of those consolidations which Rokitansky referred to the doctrine of crasis. Emphysema of the lungs, by producing dilatation of the right cavities of the heart, and con-

sequently hepatic engorgement; interruption to the flow of the catamenia; the suppression of hæmorrhoids and of cutaneous eruptions, have long been assigned as causes. Bree gives as a cause depressed circulation from external cold, and he also says the Spleen may be idiopathically affected. Idiopathic splenitis is, however, now a term inadmissible, as its inflammation, when not resulting from mechanical injury, embolism, or from continuity of structure, or the proximity of other inflamed organs and parts, is always preceded by lesion of the circulating fluids. External injuries by falls, blows, or compression may be instanced. Long walks, drinking cold drinks when the body is much heated, sudden chills after perspiration and fatigue, are also causes which may be named.

GENERAL SYMPTOMATOLOGY.—When this organ becomes morbidly affected in its acute, sub-acute, and congestive forms, the predominating indications are a feeling of pain or tenderness, or a sense of weight or oppression in the left hypochondrium, left shoulder, and left side; the breathing is often short or shallow; the patient cannot lie easily on the right side, and not uncommonly complaint is made of fulness and tension, which extend from the left side into the stomach. There may be sympathetic pains which continue through into the back and up into the left shoulder and the back of the neck. Dr. Embleton has published an able paper, illustrated by several cases relative to shoulder-tip pain in splenic diseases. He believes, as before observed, that the splenic nerves are derived from each side of the semilunar ganglion and from each of the members of the parvagus, and thus by receiving nerve-twigs from each pneumogastric, he says, the shoulder-pain of the right side may be accounted for. Grotanelli pointed out the frequent occurrence of pain in the left scapula and shoulder as an indication; Cruveilhier gives much significance to shoulder-pain as a symptom; and Bigsby, Bree, and Copland insist upon the same fact. Of ten cases of splenitis given by Embleton, in six the left pneumogastric was found tender on pressure, the right nerve in two, and both nerves in one example; and this physician says pains in the left loin, left leg, left ear, temple, and left side of the head, from the nervous connections above mentioned, may be symptomatic of splenic disease. And he thus continues: "This shoulder-pain in splenic disease will limit on the left side most commonly, as it does generally in hepatic diseases on the right side, the respiratory movements of the sterno-cleido-mastoid and trapezius muscles, and thus the splenic side of the chest will be kept more quiet than it would otherwise be. When liver and Spleen are both diseased, then both sides may be similarly affected in their movements. The above morbid state of the pneumogastric trunk may and does in its upward course affect various branches, as those of the stomach, liver, heart, lungs, and even ear, giving origin to symptoms characteristic of disorder of one or other, or of more than one of those organs; and an attentive observer may remark that many of the symptoms in

cases of Spleen disease are attributable to parts which receive branches from the pneumogastric nerve."* These facts are of much importance in judging of the symptoms of subjective character. The condition of the countenance is very indicative of splenic disease, and to the practised eye of those who have seen much of the affection in malarious countries, its presence is recognized almost at a glance. There is a heavy, dull, listless, apathetic expression which betokens that lethargic state of the mind with which the ailment is so commonly accompanied. The face is often of a dirtyish lemon colour, sometimes it looks as if puffed and swollen; the tongue, which is generally more or less coated with a whitish fur, is pale, and sometimes as if transparent; the soft parts of the throat are bloodless and flaccid, and the lips are blanched; the conjunctivæ are of bluish white, and the general facial indication is emphatically anæmic. In the acute stage, and more especially when we have reason to believe the serous covering to be inflamed, the pulse is quick and full, and in some cases it is somewhat incompressible. In the sub-acute, congestive, and more chronic forms of its lesion, the digestive or assimilating process becomes impaired, there is unusual epigastric fulness, the bowels are confined, the stools are mostly dark and may contain blood, and the urine is high coloured. Sometimes diarrhœa sets in, and there may be hæmorrhoidal loss of blood or an increase of uterine discharge. Thirst, anorexia, and elevation of temperature in greater or less degree obtain. In a week or ten or twelve days there is generally some decline, in the acuter forms, of the more urgent symptoms, and the disease becomes gradually resolved, or some sequential event, as suppuration, ensues, when other and more characteristic phenomena are presented. In the sub-acute, congestive, or latent examples of its lesion, which are far more frequently witnessed, as in those in which its affection is consecutive or the complication of another malady, as in adynamic, simple, or remittent fevers, the symptoms are to some extent—occasionally a good deal—masked by the primary complaints, and it becomes difficult to decide as to how much of the general disturbance and the more objective symptoms depends upon the specific fever and how much depends upon the disease of this organ. Sir Joseph Fayrer says, when speaking of the insidious manner in which splenic diseases come on, he has seen Europeans, and natives too, in India, who had gradually failed in health, become feeble, anæmic, with pallid lips and conjunctivæ, pearly sclerotics, œdematous limbs, albumenuria, and other symptoms, with all the indications of poisoning prominently marked, who had never had a single attack of fever or neuralgia, and who were unconscious that they were suffering from malarious poisoning. And this writer goes on to remark that such slow undermining of the health is not uncommon in many parts of India, and it contributes its share to the numbers who are yearly sent away in broken-down health. In the chronic

* *Brit. Med. Journ.*, Sep. 19th, 1874.

forms it has from the earliest times been remarked that there is often a tendency to hæmorrhage both from trivial causes and spontaneously, that ulcerated surfaces do not heal as under ordinary circumstances, and that the cheeks and gums sometimes become gangrenous. In females in malarious countries the uterine functions become much disordered in splenic diseases.

In reviewing the symptoms of splenic disease, it is all-important to bear in mind what has already been said relative to the position of this organ in the abdomen; and there are conditions and circumstances which, if overlooked, would vitiate our conclusions and give rise to erroneous diagnosis. In deformed thorax, as in rachitic deformity, this organ may be moved from its proper place. When the diaphragm is more concave than natural, the spleen ascends abnormally. In lung emphysema, where tumours are formed in the substance of the diaphragm; in effusion into the left chest, and in encephaloid infiltration into the lower part of the left pulmonary substance, it may be felt at the costal edge when not diseased. It does not normally lie so high up under the chest-wall in children as it does in adults, because in children the diaphragm is not so concave. It may be held as the common rule when the Spleen can be touched it is diseased. Palpable and external tumour is the surest sign of its lesion, and our decision should be arrived at from negative as well as positive facts. The neighbouring organs should be severally excluded. When the stomach is large and resonant, and when the descending colon and the left arch of the colon are distended with flatus, the examination of the viscus will be more difficult. When the organ is considerably enlarged, palpation and percussion discover diminished resilience. It is then brought nearer to the lower chest-wall and to the abdominal parietes. The practised hand will readily perceive the difference which is given to the fingers, and the dull, dead sound which percussion elicits will at once be recognized. Sometimes when moderately enlarged it is borne obliquely forwards and inwards, and being carried from the chest-wall, percussion discovers little or no increase of the normal area of dulness. When acutely affected, as it often is in a secondary manner in specific fevers and in pyæmia, digital examination readily produces pain; in its chronic enlargement palpation gives little or no pain. When the increase is considerable, its mechanical pressure, as I have seen, by impinging upon the walls of the stomach, is apt to give rise to the frequent feeling of nausea and sometimes to sickness and vomiting. It may from foregoing inflammation of the diaphragmatic covering and adjacent parts of the peritonæum become adherent, and when it is thus adherent to the diaphragm it may not descend with the inspirations. From its loose attachments, its smaller size, and its greater motion during respiration, it is less liable to adhesion than the liver. It may also be morbidly united to the stomach when its up-and-down motion is rendered limited. Some pathologists affirm that it is very rarely

adherent to the diaphragm. It is sometimes thus attached in chronic tubercular peritonitis.

When the diaphragm on the left side is acutely inflamed, as it sometimes is in pleuro-pneumonia, or when it is the seat of malignant deposit, its impaired functions prevent the rising and falling of the viscus, and its motion may be rendered hardly perceptible or be absolutely abolished. In empyema, when the diaphragm becomes stretched and paralysed, the same result is observed, and the organ may be thrust down below the costal edge, and thus morbid enlargement be simulated. When its enlargement is considerable it pushes up the diaphragm, forms a mechanical impediment to the expansion of the left lung, interferes with the action of the heart, and dyspnoea, coughing, and palpitation may become urgent symptoms. When the above-named conditions occur, the physical examination of the thorax will throw much light upon the splenic symptoms. It must be remembered that in some cases of its enlargement it may extend quite down to the pelvis and beyond the linea alba. In leucocythæmia it may attain these dimensions. The feeling which when enlarged it confers to the fingers is that of smoothness and resistance, and of being immediately under the abdominal parietes. Its notched and sharp edge, when felt, leaves no doubt as to its identity. When chronically enlarged the patient's gait acquires a peculiarity; he involuntarily inclines to the left side; he relaxes the abdominal muscles on that side, and accommodates himself to the uneasy feeling which he experiences; and it has been remarked that there is more freedom of motion in the right than in the left extremity. When the disease has long continued there often is a deathly pallor of the countenance, tinged with a greenish hue, and which is peculiar to the diseases of this organ. Sir William Jenner thus speaks relative to the symptoms of splenic affections:—"A moderately enlarged Spleen forms a tumour in the abdomen situate on the left side and passing upwards under the margin of the thorax. Even when of moderate size, the tumour lies near the surface; and there is no intestine in the front of it. In these particulars it differs from the kidney. It has a sharp anterior margin, and in this also it differs from the kidney. The anterior margin of the tumour passes from above downwards and inwards. Sometimes, but only infrequently, one or more notches can be felt in this border; when felt the notch is quite characteristic. The lower border of the splenic tumour is rounded; the posterior border is to the left, but not so distinctly as the anterior and lower borders. The fingers can, however, always be passed in behind a tumour formed by an enlarged Spleen. You see the resistance of the Spleen as you pass your hand back and back till you reach the space just outside the mass of muscles that lie in the spinal groove, and then you find a narrow space where there is very little resistance; the anterior border of this space is formed by the posterior border of the Spleen. Having one hand on the posterior

border of the tumour, and the other in the front on the anterior edge of the tumour, you find that it is movable from side to side. You can push the anterior border towards or away from the middle line; you move the Spleen thus when it is enlarged, because it is very rarely indeed closely adherent. You know how loosely the Spleen is attached by the mesentery, and it is infinitely rare for the inflammation of the capsule of the Spleen to be followed by adhesions sufficiently close and numerous to destroy its mobility."

When the left lobe of the liver is enlarged—and it may be enlarged much more than the right, but in nearly all instances where one lobe is diseased the other is diseased also—it may be mistaken for the Spleen. Bright observes that in such cases the margin of the liver may be traced running towards the right side. The Spleen, it should be remembered, lies anterior to the liver. A deep inspiration will generally solve the difficulty, because the Spleen more distinctly rises and falls than the liver, and it descends lower than the left lobe into the abdomen. In hepatic lesion the common symptoms of jaundice, dulness, and tenderness in the right hypochondrium, and the colour of the alvine and renal excretions, will assist in conducting to a right conclusion. Left kidney enlargement may simulate enlargement of the Spleen, and more especially when the former is encysted. The left kidney is placed nearer the spine, it is more fixed, the intestine lies before it, and if the patient is requested to place himself on his hands and knees, the kidney does not drop forward so much as in this position the Spleen will drop forward. In renal tumour, the anterior upper and under borders are smooth; there is no sharp defined edge to be felt as there is in the spleen and left lobe of the liver. Coughing and deep inspiration do not move the kidney, as they move the Spleen, downwards. In cystic formations and turgid growths of the kidney the tumour can be traced forwards and towards the umbilicus, and if traced backwards the dulness is continuous and uninterrupted towards the spine. The kidney has its seat close to the lumbar muscles; there is no space between it, as there is space between the Spleen and these muscles. In doubtful cases, as to whether the enlargement be renal or splenic, the ordinary tests and the microscopical examination of the urine will aid in making a correct decision. In renal disease the pain often takes the course of the ureter, and in the male there is mostly pain in the direction of the testicle. Renal abscess may resemble enlarged Spleen, but renal abscess extends back more completely into the lumbar region; it is fixed, and does not alter its position when the patient is turned on the right side, and it feels tense and elastic to the fingers. Bright remarks that an accumulation of faeces sometimes renders the diagnosis extremely difficult. But Jenner says faecal tumours are very rare. They may be most certainly judged of by their altering their position; their configuration, as ascertained by digital examination, varies; sulcated irregularities and depressions can be felt; and the adjacent colon is often tympanitic. There is

too often the history of constipation, and of constipation alternating with liquid stools. A dose of castor oil or a large enema will in nearly all cases remove any doubt entertained. Ovarian tumour will be recognized by the ordinary symptoms of that form of disease. In such cases the tumour is first felt lower down in the abdomen, and its enlargement is more rapid. Percussion elicits resonance between the costal edge and the lower defined dulness. When the fundus of the stomach is the seat of cancer, and a large cancerous mass is formed in that situation, the general cachexia, the sickness and vomiting, and the loss of flesh will commonly indicate the malignant complaint. In scirrhus of the omentum the tumour is rough, hard, and knotted; it stretches like a flattened indurated mass over the front of the abdominal viscera; it is not confined to one side; it is not traceable up under the costal edge like splenic tumour, and pain and sickness I have known to be most distressing symptoms in cancer of the omentum. Subcutaneous collections of purulent matter over the regions of this organ have been said to resemble splenic enlargement, but their superficial and stationary positions render their true nature distinguishable. Acephalo-cyst hydatids may rise from the spleen. Such cases are exceedingly exceptional, and when they do occur their elastic, rounded, smooth, bossy form will make them known when carefully examined.

GENERAL PATHOLOGY.—Organic lesions of the Spleen are, in the great majority of instances, secondary or sequential. They arise from some form of inflammation, in many cases as the result of fluxionary or obstructive causes. There may have been less of vital cohesion in the gland or certain morbid alterations in the circulating fluids. From the relaxing and yielding tissues of the Spleen abnormal increase of blood in it is much favoured, and when such surcharges have been long continued and frequently repeated interstitial changes are apt to follow. Perversion in the function of the organic nervous system tends to such fluxions in this viscus. Experiment has shown that dividing the branches of the sympathetic which go to the organ is succeeded by its turgescence. Dorsdoff and Botschetschkaroff of St. Petersburg made a series of experiments relative to the swelling and contraction of this viscus. They observed all its diameters enlarged when the nerves of the splenic plexus were divided, and that these diameters were diminished when the peripheral ends of these nerves were electrically excited; they noticed the liver to become augmented in volume, denser and of lighter colour when the Spleen was thus artificially contracted, and that with each of its contractions white blood-cells were discharged into the hepatic blood. It would seem, too, from the researches of these experimenters, that the contraction and enlargement of the organ are, not as Müller and others have maintained, wholly dependent upon vaso-motor function, but also from the influence of its muscular elements. Such being the effect of cutting off of normal nervous influence, it can be understood when the blood is infected by malarial and specific poisons how

contractility becomes diminished and varying morbid processes are instituted. When there is obstruction and closure of the portal vein, as sometimes takes place in hepatic disease, such as in cirrhosis and cancer, or when there are tumours which produce mechanical pressure, congestion of the Spleen may occur in marked degree. In heart and lung disease its enlargement is less common. The parenchyma is less prone to inflammation than the envelopes of the organ; and this fact can readily be comprehended when the structure of the respective tissues is considered. From the statements of Gray and Kölliker the parenchyma is constituted of microscopic fibrous filaments, capillary-vessels, pulp-cells, and blood-globules, in various states of dissolution, the pulp-cells resembling the Malpighian corpuscles, only being smaller. The Malpighian corpuscles are imbedded in the pulp, and always attached to a minute branch of an arterial twig, united to its extremity, resting upon a vessel or situate at the angle of division, and are filled with viscid albuminous substance which contains nucleated cells. Such being the minute arrangement of its structure, a considerable and sudden afflux of blood may be accommodated. The first condition of its most common morbid state is that of congestion. Its proper vessels become engorged, the trabeculæ lose their elasticity, the capsule and its serous covering are unduly stretched, and the inflammatory process supervenes. Pemberton vaguely attempted to account for this peculiarity by saying there is a want of proneness in the arteries to take on, as he termed it, the essence of inflammation. In tissues more dense and resisting, the irritation which vascular pressure confers sooner and more demonstratively proclaims the inflammatory phenomena. Bree thinks pyrexia is prevented by the turgid and accommodating qualities of the vessels. In the process of inflammation, its substance is apt to be broken up and the pulp rendered semi-diffuent, being mixed with shreds of trabeculæ and vascular sheaths. The antecedent morbid changes of these more manifest conditions are an occult impairment of the organ's vital endowments, whereby follow excessive interstitial exudation of plasma, which is unsuited to healthy nutrition; the blood-globules become more than normally dissolved, and the fibrine is increased; and perverted nervous action so influences vascular action as to affect the splenic cells and capillaries. There is, doubtless, between the intertrabecular spaces and the vessels some kind of communication not yet understood. The blood constantly passing from these alveolar cavities carries with it cellular elements; but if from any cause the onward flow becomes impeded, there must be morbid increase of the pulp, because the cells are then abnormally accumulated. In certain acute diffusive processes the loss of the natural blood stasis is very apparent. According to Billroth, the ultimate and molecular changes of the Spleen in typhus are very characteristic. In the veins he found a surprising quantity of cells containing from two to six nuclei, the normal cells being greatly diminished. In this disease the Malpi-

ghian corpuscles exhibit a decrease of cell formation. The large cells in typhus spleens diminish relatively with the duration of the fever. Fayrer, whose opportunities of studying the disease of this organ were very extensive, believes that important changes take place in the Malpighian corpuscles, and parenchyma or pulp, whilst the arteries and veins and venous cavities have a proneness to be dilated. The more important defects of the blood itself he conceives to be the relative quantity and quality of the corpuscles, the tendency to depositions of fibrinous coagula, and the liability which there is to gangrene and tissue degeneration from embolism in either the pulmonary or systemic circulation. In chronic cases he asserts that adipose and albumenoid formations are produced, or where embolism of the splenic vessels has occurred, local death or disintegrations of portions of its substance, resulting in puriform collections, are the not uncommon eventualities. Embolism of the pulmonary artery has been particularly mentioned by more recent Indian authors. In pyæmia and septicæmia the morphological change most usual is tumefaction of the cell elements. In hæmorrhagic infarction the venous sinuses are generally discovered in a thrombose condition, the blood-globules being matted and massed together in heaps. In putrid and adynamic fevers it sometimes appears as if the pulp had been abolished and the body of the organ converted into a dark grumous fluid, the coats being loose and flaccid, easily torn, and the contents being readily poured out. Softening and enlargement of the viscus are the constant conditions in malignant fevers. In periodic fevers this soft and deliquescent process not unfrequently goes on into the suppurative state. Pus is then found in a number of small deposits, or in a single large collection. The existence of suppuration cannot, however, always be determined upon, and it has been present when physicians of great practical acumen have not even suspected it. According to Andral, pus in minute yellow drops sometimes infiltrates the entire substance of the viscus. It is generally of the creamy kind, but Cruveilhier says it is occasionally concrete. When the suppurative result has taken place, the membranes well-nigh always become affected, just as in hepatic abscess the peritoneal tunic becomes inflamed and dissection discovers lymphic adhesions. The organ may thus be agglutinated to the stomach or the colon, ulceration take place, and the purulent secretion be poured into one of these hollow viscera and be vomited or passed by the bowel. Under the continuous and great tension of the capsule, and when it has been rendered tender by disease, it may give way and the pus be extravasated into the cavity of the peritoneum, when diffuse and flagrant peritonitis is speedily established and death soon follows. Sometimes in acute splenitis adhesion takes place to adjacent parts with little injury or inconvenience.

In more exceptional cases, when the process of inflammation has been protracted, there is an indurated condition not only of the

envelopes and the fibrous tissues of the organ, but also of its parenchymatous substance. This state is mainly caused by the condensation of the coagulated matter contained in the cells. There is abnormal deposition of the lymph, and in such examples the cartilaginous tendency is exemplified in the denser structures. There is hyperplasia of the interstitial connective tissue.

Chronic is of far more frequent occurrence than acute inflammation of this organ, and it is this form which is so frequently connected with intermittent and remittent and also other forms of fever. It is sometimes the consequence of hepatitis, dysentery, chronic diseases of the liver, and more especially, as before remarked, of obstructed portal circulation, and organic affections of the heart and large vessels, and when the natural crasis of the blood has been impaired. In malarious countries it is a malady very frequently presented to the physician, and it is from the accounts of those who have resided in the tropics, and whose deductions have been made from a large amount of experience, that we have the best and amplest descriptions. The chronic may be the result of the sthenically acute form, but such examples are exceptional, as slow and gradual congestion is the common forerunner of the kind of lesion now more particularly considered. The earlier stage of the complaint is often masked by the ordinary symptoms incident to the intermittent or remittent attacks, and in proportion as these diseases are in their course marked by asthenia, the splenic complication is less prominent and less easy of recognition. It has sometimes, when the physical signs have been neglected, made an insidious advancement before detection, and sometimes its lesion has not been discovered before dissection. It may be large, and its lesion obtains when there are no subjective signs. The patient tells you he can lie on either side, takes a long breath without uneasiness, and complains of no dulness or aching under the left chest. The older physicians, who knew nothing of the kind of physical examination now practised, had to depend upon more general symptoms, and consequently they not unfrequently altogether overlooked this viscus. Bree says it may have made great progress before being observed, and that there may be pain with little enlargement, and that there may be great enlargement with little pain, and that the pulse may give no evidence of the malady. Pemberton states that it may be thus diseased without producing any uneasiness whatever. William Hunter, De Haen, Grottanelli, and various Indian authors and more recent writers expatiate on the covert nature of the affection, and lay emphasis upon its insidious character. Being frequently the accompaniment or sequel of intermittent or remittent fever, the severity or mildness of its lesion varies much according to the nature of the endemic influences, the preceding health, and the vital powers of the individual. Enlargement is the most notable of all conditions of chronic splenitis; but this should not be the only object of inquiry, as such condition is but the manifest state of a great and foregoing

malady pervading the entire system, and we should give due attention to those antecedent and existent changes by which it is produced. An extraneous and deleterious agent is imbibed into the body, and the entirety of the circulating fluids undergoes a potent and morbid alteration. It may be that the nervous centres are primarily affected, and more especially the nerves of organic life, and that the organ which, as it has already been said, is so importantly, so eminently concerned in the evolution of corpuscular germs of the blood, may in greater degree than in any other organ be impressed by the poison. Other poisons, which give rise to specific fevers, exemplify their peculiarities in affecting certain and distinct organs and tissues; and the cause of their diversity of action can only be in certain subtle and essential differences in the primary and extrinsic agent. Accompanying the chronic ailments now considered are great debility, languid circulation, deficiency of red-blood globules, and a yellowish pallid unhealthiness of aspect. The expression is dull, the mind apathetic; in addition to the dirtyish lemon hue of the skin, the facial integument is sometimes puffed and bloated, the eye looks clear and blanched, the lips, tongue, and fauces are typical of anæmia. Muscular debility and general inertness are apparent, and in this lowered condition the functions of respiration, assimilation, and secretion become gravely affected. That hæmorrhage, dropsy, or gangrene should sometimes follow the train of morbid processes now instanced cannot be surprising. Such depravation of the fluids is inevitably succeeded by more obvious and pronounced pathologic changes. Cullen had long ago pointed out how the kind of splenic affections now more particularly referred to may end in resolution, suppuration, or gangrene. It has been stated above that chronic splenitis may come on without subjective symptoms, and it sometimes happens that it may make very slow progress, and with little or no suffering. In other instances there is some discomfort from tumid belly and difficult respiration; and there may be alternative periods of improvement and remissions of an aguish character for many months, or it may be for years.

In certain examples of excessive splenic hyperæmia, and when the fluxionary surcharge of the organ has been sudden, the symptoms of anæmia quickly supervene, and more speedily than could be looked for in any general blood change. The temperature may, as it frequently does, rise high during the intermittent paroxysm; but it may be equally high in continued fever, and the tissue oxidation and blood consumption be as great; but the symptoms of anæmia are far more emphasised when the periodic type has preceded. Mechanical causes doubtless explain this peculiarity. The symptoms of bloodlessness are produced relatively in rapidity and degree with the suddenness and extent of the splenic enlargement. Such a congested condition of this organ means really the abrupt and temporary withdrawal of a large quantity of the vital fluid from the system. If the hyperæmia quickly decrease, the anæmic symptoms

also begin to disappear, and with more quickness than would be the case if such depended on the improvement of impoverished blood. A general amelioration in the circulating fluids would require far more time. The experiments of Griesinger have shown the correlation which subsists between these symptoms and the rapid enlargement of the viscus. The fluxionary hyperæmia incident to the respective types of continued fever is neither so excessive, nor does it produce the kind of symptoms now particularly considered. When the forms of continued fever have run their course, and convalescence succeeds, the organ is restored to its normal condition. In remittents it is not so, and more especially if the paroxysms have been often repeated. Continued tension effects alteration in fibroid and vascular structures, and augmentation of volume follows.

The morbid condition of the blood which is now known as melanæmia is doubtless referrible to an abnormal process carried on in this viscus; for nearly all observers now regard the Spleen as the place where the pigment is formed in the melanæmic dyscrasia under the influence of the malarial cachexia. The German pathologists were the first to investigate this subject, and prominently point out the manner in which the pigment is formed in pernicious intermittent fever. According to Rindfleisch, pigmentary particles are discovered floating in the blood. Their shape is irregular; they may be yellow or brown, but are more commonly black granules; as the rule, they are smaller than the blood-corpuscles, but a few may be seen which are of larger size. Some are spindle-shaped corpuscles, others are round, and the particles of free pigment vary in their physical configuration. Trousseau, in speaking of this pigment, says it is mainly formed of granules which are amorphous, sometimes irregularly agglomerated, and sometimes cylindrical, from having been moulded in the interior of vessels. The product now spoken of is consequent on the transformation of hæmatine. The tradition that black substances are generated in the Spleen and blood is one of the oldest doctrines in the history of medicine. From the days of Galen to the times of Van Helmont, Sylvius, Boerhaave, and Van Swieten, the cause of this condition was under various theories discussed. Certain of the ancient writers were of opinion that the fluidity of the blood under particular and specially perverted processes in the organism was diminished, and that a black and condensed product resulted; and some enunciated the notion that the more solid character of the new substance gave rise to mechanical obstruction in the viscera, and more especially in the brain, and thus were accounted for these grave effects of which it was the forerunner. It was the doctrine of Hippocrates, humoralism still maintained, but under particular modifications. Kämpf added to atrabiliary matters other substances produced in the plasma of the blood. Reil in the last century opposed the ancient notion of the physiological effect of black bile, and subsequently Heusinger

and Puchelt attributed the pathological phenomena to the deposition of a black pigment. Lancesi and Stohl had long before noticed a dark tinging of the skin and black deposits in the brain of those who had died of malarious fever; and, coming down to later times, Bailly, Bright, Annesley, Haspel, and Stewardson commented upon this morbid condition. In 1837, Meckel fully and satisfactorily ascertained that this dark colouring of organs and tissues depended upon pigmentation derived from the blood, and he was of opinion that the pigment formed in this gland passes into the portal blood, that the larger particles are detained in the hepatic lobular zones, and that the finer particles pass through the liver to be transferred to various parts of the body. The blockage which it effects has been called microscopic embolism. Virchow, Heschl, and Planer more recently gave illustrative examples of this now commonly received fact. The Spleen is the organ where the pigment is manufactured, and more especially when that organ has been repeatedly and excessively congested. In the stasis of hyperæmia the blood-globules are decomposed and their hematine becomes transformed into pigment. It is then carried into the vena porta, into the liver, the vena cava, and into the heart, thence to be diffused into the general circulation. Some American observers have known pigmentation confined to the portal blood. The malarial poison causes splenic hyperæmia, and consequently extensive destruction of red-blood corpuscles. Frerichs says in the hyperæmia of the Spleen, consequent upon intermittent fever, the stagnation is exceedingly great, and as a result the formation of large masses of pigment. This writer also believes that, in exceptional cases, the liver, and not the Spleen, may possess the capability of making pigment. He gives a case in which none was discovered in the Spleen, but in which much was detected in the liver. As the melanæmic dyscrasia is not always observed in splenic enlargement consequent on pernicious intermittents, and as occasionally pigment is present when the hyperæmia is not excessive, a mere mechanical way of accounting for this result can hardly be admitted. It is exceedingly presumptive that the marsh miasm under certain conditions and in certain epidemics causes excessive necrosis of red-blood corpuscles. The relative virulency of poisons will determine the degree of necrotic power, but of the altered physical conditions giving rise to such effects we have no means of judging. The experiments of Virchow lead him to believe that in great destruction of the blood-cells in the Spleen the hematine passes into the colourless elements of the spleen-pulp, and by this means enters the blood. This writer is also of opinion that the bright substance adhering to the pigment granules consists of the protein matter which was combined in the fibrin of the disintegrated corpuscles. Rindfleisch says pigmentation occurs in the intervascular cords of the spleen-pulp where the blood flows most slowly; and as the intervascular cords are not shut off from the cavernous veins

by an impermeable membrane, filtration goes on between the arterioles and the venous radicles, and in this way pigment flakes pass into the blood. In those organs in which the capillaries are the narrowest, pigment deposits are most marked. It is thus that black matter is so frequently discovered in the brain. The *retia mirabilia* of the kidneys are unfavourable to the passage of these particles, and thus the kidneys next to the brain are most liable to melanæmic pigmentation. Such being the obstructive qualities of this product, the pathogenic theory has been promulgated that the graver symptoms of pernicious fevers may be attributed to pigmentary embolia. Extensive destruction of blood-globules from the cause now described must necessarily be followed by a general impoverishment of the blood, and thus in marsh fevers, anæmia; hence that peculiar colour of the face in malarial cachexia, and which is so characteristic of chronic disease of the Spleen. In well-marked cases of pigmentation the Spleen is discovered of dark brown or bluish black colour; which may be uniform or the parenchyma may be speckled. The organ is then soft, congested, and generally enlarged.

There are two morbid conditions incident to this viscus from *morbus cordis*, which, though possessing great similarity, exhibit different diseased conditions. In cardiac ischæmia the organ becomes dark, and it may be somewhat indurated, and the entirety of the parenchyma assumes that alteration of colour and consistency. In that infarction which is preceded by inflammation and ulceration of the endocardium, and therefore in connection with blood changes, defined patches are seen on the surface which are paler than other parts of the capsule, and which places on section are wedge-shaped, the apex being in central direction, the base at the surface. The arteries supplying these circumscribed spots have been found blocked up by ante-mortem clots. The vascular walls at length give way, blood is effused into the circumjacent substance, or the limited areas of such extravasations assume something of that apoplectic character which is known from a like cause to eventuate in the pulmonary parenchyma. Absorptional wasting, the formation of pus, or capsular peritonitis, are apt to follow. It was the opinion of Rokitansky that the chief diseases of this viscus arise from anomalies in the blood and serum, or from certain dyscrasiæ, not well understood, yet which bear a remarkable and positive relation to the Spleen. When speaking of secondary splenitis, caused by the absorption of poisonous inflammatory products, or affected in an analogous manner spontaneously, and showing the delicate reaction of this organ upon a morbid state of the blood, he says the formation of inflammatory spots is in every way remarkable. They are well defined, and occupy the peripheral portion of the organ, presenting a cuneiform shape, the base being at the surface and the apex pointing towards the centre. That author considers this form of its inflammation to be identical with pyæmic deposits, and to consist of the metamor-

phosis of an infected coagulum, within the channel of a vascular ganglion. These fibrinous blocks, to which reference has already been made, like apoplectic extravasations, have a tendency to deliquesce; but when they originate from cardiac emboli, as they sometimes do originate in this organ, there is not that proneness to rapid softening and disintegration which there is when pyæmia is the cause. The sudden arrest of nutrient blood to any particular area, as shown by Cruveilhier and Wharton Jones, at once produces capillary congestion, which is followed by the consequential and more cognizable phenomena of inflammation. Kirkes and Virchow pointed out that detached fibrinous vegetations in cardiac disease, and most especially in endocarditis, are swept on in the current of the blood until they block up an arterial branch, or it may be several branches, in some distant organ, as the brain, the lungs, the liver, the kidneys, or this viscus. Sometimes embolic infarctions have been found where no conditions could be detected to which the causation of emboli could be referred. The so-called arterial thrombosis might be the cause. When no valvular roughening nor any acute cardiac disease has preceded, ante-mortem coagula, from long enfeebled heart's action, might, as some pathologists have suggested, give rise to the phenomenon now more particularly considered. When these fibrinous pieces were deposited in the kidneys as the consequence of emboli or acute rheumatism Rayer regarded the morbid condition as that of rheumatic nephritis. That which Rokitansky looked upon as capillary phlebitis is embolism, and the cuneiform blocks, when unassociated with greater evidence of pyæmia, may correctly be attributed to fibrinous obstruction. Dr. Wilks had under his care a young man in Guy's who died of ulcerative endocarditis. On examination after death, the Spleen was discovered to be covered with lymph, which was evidently of recent formation. On section, the organ was seen to contain large abscesses of greenish glutinous pus, which did not resemble softened fibrine, and the arteries running into the abscesses had plugs of the same granulation-like substance which was found in the mitral valve. The Spleen is not the usual seat of pyæmic suppuration, but is more frequently the place where emboli give rise to suppurative process when caused from cardiac disease. Sometimes it is difficult to say whether such depositions come from a pyæmic or an embolic cause. There is no doubt, also, that fibrinous clots may be produced in the arterial branches themselves, and that such pieces may plug up vessels of smaller calibre, and the same morbid results obtain. The consequences of thrombosis and embolism are on the whole very nearly the same, if not identical with those pathologic changes which obtain in secondary pyæmia. Still there are distinctions between these affections. In pyæmia there are generally purulent deposits in some other parts of the body, and not unfrequently the affection is obviously referrible to a localized cause. There is, also, great tendency to suppurative decomposition. The proneness to destructive and de-

generative change is more apparent than in mere embolia. When in secondary pyæmia the Spleen is affected, the morbid conditions which inspection reveals are dark circumscribed extravasations of blood, which are of apoplectic character; they exhibit a great tendency to break down and degenerate into puriform collections, and there are generally some small abscesses to be found in the parenchyma. Murchison reports a case of embolism of the viscus produced by enteric fever, and in which dissection revealed two yellowish wedge-shaped deposits of the size of chestnuts, and he asserts that this kind of deposit is the most common in the Spleen as the result of enteric fever. This physician also describes the same kind of pathologic appearance as following relapsing fever. A young man aged twenty died of this type of fever, and his Spleen was found to weigh thirty-one ounces. The organ was soft except at either end, where there was a firm pale mass as large as a small orange, and exactly like the masses ascribed to embolism.

There is doubtless some similarity between the condition of the blood in scorbutus and between the condition of the blood in chronic splenitis. In both forms of disease the cicatrices of ancient wounds and old ulcers are apt to break open, and cutaneous injuries are difficult of healing. Graves mentions the tendency of chronic splenitis to give rise to suppurative ulceration of the legs, and he quotes from Aretæus, who in his time had not failed to observe the same peculiarity. Voight affirms the same to obtain in Bengal. The latter records that blisters and even leech bites produce phagedæmic ulcers which run on to a fatal termination. Twining gives similar testimony. He says patients are prone to sloughing ulcers from slight wounds and bruises; also that those peculiar characters of active inflammation,—and that constitutional energy on which the deposition of coagulable lymph depends, and by which we find injuries repaired, and the extension of ulceration as well as the progress of sloughing arrested on ordinary occasions,—seem to be in a great measure, if not entirely subverted. He remarks, too, that the blood drawn from patients coagulates imperfectly, and that the crassamentum was not infrequently black and soft without exhibiting the buffy coat. On this particular Sir Ranald Martin thus writes:—"A wound or trifling abrasion, which at another time would escape notice, now becomes a foul and sloughing ulcer, owing to the depraved state of the blood, and the generally diseased state of the system: hæmorrhages arise from slight causes, sometimes spontaneously; and so altered is the character of the blood, from the want of red globules apparently, that when performing surgical operations of immediate necessity at the Native Hospital of Calcutta, I always became aware of the presence of splenic disease on making my first incision, the hue of the blood being demonstrative of the fact." Muscular debility, impairment of the respiratory and assimilative functions, dropsies, and gangrene of the cheeks and gums, are the not uncommon associations of such depraved condition of the circulating fluids.

There is a large class of diseases of acute forms, which are not localized, in which the entire mass of the circulating fluid undergoes change, and in which, as above observed, the Spleen in greater or less degree becomes implicated. In specific fevers such is eminently the case. Some morbid materials, it may be the matter of contagion, some miasma or virus is imported into the system; it is infinitely multiplied in the blood, and certain constituents of the blood undergo transformation; and in such diseased condition of the circulating fluid new morbid products also become added to it. In the various kinds of continued fever, in the exanthems and periodic fevers, such changes very largely enter. Certain of the German pathologists have latterly attributed much importance to splenic enlargement when associated with acute febrile affections; and they regard such enlargement as an objective and a prominent fact which ought to count for much in the formation of diagnosis. Friedreich of Heidelberg is of opinion that the tumefaction of this organ in numerous acute febrile diseases cannot satisfactorily be accounted for on the assumption of simple fluctuation, and he says we must look for other causes for the great hyperplastic proliferation which is, under such circumstances, not unfrequently present in the pulpos elements of the viscus. In the class of cases now particularly instanced, there is, doubtless by the importation of foreign matters into the blood, special irritation instituted in the splenic pulp. This writer insists that such changes of volume in the spleen would often justify us in deciding as to the infectious nature of a malady when the etiology might be otherwise obscure. He goes on to say, "The readiness with which the spleen reacts to certain substances of an injurious nature present in the blood is explained, not only by the copiousness of its blood supply, but also by its anatomical peculiarities. We know that the arteries in the interior of the spleen break up into very numerous, extremely fine branches and capillaries, perforated by stomata, that the blood passes from the vessels into wide spaces destitute of walls (the intermediary blood canals), from which the veins begin to arise in like manner, principally as cribriform canals. The blood flows with extreme slowness through these wide intermediary canals, and both here and in the cribriform perforations of the capillaries is in intimate connection with the lymphoid cells so susceptible to irritation, and the delicate, fibrous network of the pulp. Hence it follows that matters of an injurious nature infecting the blood are extremely liable to be retained in the spleen, to accumulate therein, and to act with peculiar intensity as excitants to the splenic tissues." The authorities on this subject point out with much assurance the regular occurrence of splenic tumour in enteric fever. In doubtful cases of enteric they would regard this physical sign as decisive of the diagnosis. Jürgensen, in what he terms *typhus levissimus*, looks upon the presence of splenic enlargement in doubtful cases as sufficient, in conjunction with other symptoms, to indicate the true nature of the primary malady. It is not, however, supposed that there is an

exact correlation between the augmented volume of the organ thus increased and the gravity of co-existent febrile phenomena. The spleen, they say, may be large in the mildest forms of enteric, and only moderately augmented in the severest examples. The resisting power of the constitution against the irritative properties of the contracted infectious matter, they affirm, will account for this disagreement in the greater or less obstructive effects, and the more pronounced or moderate hyperplastic turgescence. The spleen, it is said by the authorities to whom reference is now made, thus becomes acted upon at the very outset of the enteric attack, because the specific poison of that fever has a remarkable tendency to morbidly influence this viscus. Some of these writers aver that splenic tumour supervenes even during the incubation stage of enteric, and that it is the last amongst those organs usually affected in that complaint which returns to the normal size and condition. And relapses in enteric are said to be more probable when, during convalescence, the spleen is slow in its diminution. Sometimes the swelling will be to such a degree that it will project to a considerable extent below the costal edge. It is to be held in mind that on making an examination of the state of the spleen in enteric fever much fallacy may result from the condition of tympanitis, and there may be decided enlargement, whilst the region when percussed is resonant. Careful palpation is then our safest guide. Jürgensen says enlargement of the spleen occurs probably in all cases, and is a constant symptom even of the mildest enteric. Out of eighty-eight cases, in seven only was enlargement not recorded; hence it was recognised, therefore, in ninety-two per cent., and, he remarks, it was often demonstrable very early, not rarely on the second or third day of the disease. Sometimes a long period elapses before the hyperplastic elements undergo solution and absorption, and before the contractile functions of the organ become fully restored; and such tardiness in a return to the normal configuration is doubtless not only dependent upon the presence of new materials thrown out, but also consequent upon the grave impress being made by the specific poison upon the splenic plexus. In diphtheria, as in enteric fever, the spleen is said not uncommonly to be increased in its diameters. Birch-Hirschfeld says splenic tumour occurs as the rule in hæmorrhagic variola, and Trojanowsky attests to the same coming on in scarlatina and measles. In the first-named he had several times been able to demonstrate clearly the existence of a splenic tumour in the initiatory stage, and in the majority of instances after the appearance of the eruption. During an epidemic of measles which raged in Heidelberg in the winter of 1873-4, Friedreich repeatedly convinced himself of this complication in that exanthem. In erysipelas, in acute coryza accompanied with febrile phenomena, and in that masked, wandering, and which has been termed serpiginous form of pneumonia as contradistinguished from the better defined and more recognised croupous inflammation of the lungs, these

physicians affirm that splenic tumefaction is usually to be discovered, and that the proneness of this viscus to exceed its natural size in these respective ailments affords proof of their primarily infectious character. If the foregoing statements, which these writers have with such prominence put forth, are found to hold good as the rule and not exceptionally, splenic tumour would often and very properly be sought for as an aid to diagnosis in many otherwise ambiguous instances of infectious diseases. During the first six or eight days after the invasion of enteric fever, when the true nature of the complaint sometimes puts on such conflicting appearances, and when there often is to the most experienced eye so much difficulty in its recognition, an additional fact like that now spoken of, to aid in our decision and direct our judgment aright, would be of the greatest value. "I feel convinced," says Friedreich, "that a careful consideration of the condition of the spleen would enable us to recognise the infectious nature of many disorders which present themselves as apparently merely local affections, and that the group of the acute infectious diseases would be thereby considerably increased." That the spleen is frequently involved in the various forms of febrile affection, and to a greater extent than was formerly supposed, can hardly be disputed, but that it is so very commonly the seat of lesion, as these pathologists insist upon, requires still a greater accumulation of proof.

If the endeavour were made to enter into an explanation of these etiological conditions whereby the spleen is so prone to become the seat of lesion in various infectious diseases, such would be to discuss the fundamental agencies of contagion and miasma, and in much that could be advanced to pass into the dubious domain of hypothesis. Late investigation has, however, elicited not a little which seems in no slight degree to harmonise with theories which have long been put forth, and which have been believed to be explicative of clinical phenomena. If we are to endorse the notion of attributing to the origin of many acute infectious ailments the absorption of a *substantia viva* into the body, the primary blood contamination can then be understood. The more recent researches of pathology tend to give credence to the supposition of minute low vegetable organisms constituting the cause of that class of diseases to which reference is now particularly made, and this view in some degree gives confirmation to the doctrines which found favour with the older physicians, who held the idea of a parasitic origin of diseases. The generic group of these organisms which has been named schizomycetes is said to possess species called bacteria, bacteridia, vibriones, spirillæ, and other distinguishable kinds of minute entities, and it has been imagined that each of these microscopical organisms gives rise to a distinctive train of morbid actions. Davaine showed malignant pustule to be preceded by bacteridia in the blood; Klebs believed from certain experiments that the microsporon septicum could cause continued fever; and Letzerich has maintained

that the schizomycetes discovered in the blood in diphtheria are peculiar, and differ from the other and recognised forms of those in the lowest types of animal life. If, then, acute infectious diseases are to be referred back to the presence of varying and dissimilar microscopic organisms, much light may be said to be thrown on the origin of what is termed the great class of zymotic diseases, which destroy a sixth part of the population. It is the opinion of those investigators who have closely studied this subject, that morbid phenomena are not to be referred merely to the presence of these corporeal particles in the blood and their mere physical effects, but rather to the irritating virus which they secrete, and the power which such virus possesses of instituting diseased action; again, they may, it is possible, abstract from the blood certain constituents essential to nutrition and the normal forces of vitalism, and hence another cause favouring morbid processes. The function and nutrition of organs and tissues having become implicated, a greater or less amount of disorder would be given to the general system. And as it has been said that some particular parts are more liable to become the habitation of schizomycetes than other parts, a local prominence would thus be conferred to the disease. The vascular apparatus of the spleen has been said, as above remarked, to favour the concentration for these minute and organised germs. Coze and Feltz in small-pox detected the largest number of bacteria in the spleen; Birch-Hirschfeld saw micrococci in large accumulation in that organ; and Grimm discovered in animals which died from malignant pustule, bacteria very numerous in this viscus. If the views above cited are to be accepted, and if these organic particles largely accumulate in the spleen, then their poison would also be concentrated in the protoplasm of the cells of the pulp, and thus an explanation is afforded of the early manifestation of splenic tumour, and, too, a reason is given why this organ is slow in its return to a normal state. Certain animals are subject to what is called splenic fever, splenic apoplexy, or Milzbrand, and that such disease according to Pollender is caused by staff-like bodies found in the liquor sanguinis of from $\frac{1}{3500}$ to $\frac{1}{2000}$ of an inch in length, and that bacteria follow these which are capable of spreading the disease. And these rod-shaped organisms, it is said, can be communicated from the lower animals to man.

In pyæmia, ichoræmia, and septicæmia, and in purpura and scurvy, lesions of the blood constitute the cardinal symptoms. In nearly all, it may perhaps be said in absolutely all, of these named, there is decrease of fibrin and excess of red-corpuscles, and, as a consequence, one or other form of hæmorrhage often comes on. When in these complaints this organ is in secondary manner affected, and its congestion gives rise to hæmorrhage, the loss of blood may be from epistaxis, or hæmatemesis, or by the passage of blood by the bowels. The tense and fibrous tunic of the viscus prevents its being relieved by serous exudation, as the lungs are relieved by effusion

into the pleura, the peritoneum by ascites, or as a congested liver and a congested gastro-intestinal surface are relieved by serous diarrhœa. Sometimes the hæmorrhage by epistaxis, or by hæmatemesis, may be to an alarming degree or it may be fatal. A young man of pallid and anæmic aspect was some time ago admitted into the Tunbridge Wells Hospital under my care. He stated that he had gradually lost flesh and strength, and that he had been obliged to relinquish his ordinary employment, which was that of a farm-servant. He was twenty-two years of age, the physical signs of the thorax were normal, there was no hepatic enlargement, nor had he ever been jaundiced. On careful examination the splenic dulness far exceeded the normal area, the edge of the organ could be felt depending below the left cartilage, and it extended horizontally nearly to the mesial line. I carefully mapped out the lines of dulness on his admission. He was treated with iron, sulphuric acid, and bitter infusions, the bowels being moderately acted upon by aloetic purgatives. He was discharged at the end of a month, looking and feeling better, and on percussion the splenic dulness occupied a decidedly diminished space. After having left the institution ten days profuse loss of blood came on from the mouth and nose. The hæmorrhage continued at intervals during the three succeeding days. He lost a very large quantity of blood, and sank from exhaustion. Sir T. Watson says he has more than once seen hæmatemesis in connection with splenic enlargement, and he quotes from Morgagni, who relates a case wherein, after repeated attacks of hæmatemesis, the patient sank, and on cadaveric inspection the viscus was found to weigh five pounds and to be gorged with dark blood. He also cites from Frank, who gives the history of a patient who had vomiting of blood, and the organ weighed sixteen pounds. That case had, however, evidently been one of leucocythæmic enlargement, as we now know that in white-globule-blood hæmorrhage is liable to occur. Latour gives several cases which he had selected from various authors, in which splenic enlargement was followed by hæmatemesis. An illustrative example of that which is now asserted occurred to me. A lady who had a very large spleen which almost fully occupied the left hypochondrium, and the anterior edge of which extended to the median line, and whom I professionally saw from time to time, had a terrible attack of hæmatemesis. She then lost within twenty-four hours between four and five pints of blood, and the exsanguination became so extreme that she had syncope. From my first acquaintance with this patient she looked pale and anæmic, and there were all the external appearances of splenic disease in addition to the more conclusive testimony of markedly existent physical signs. The hæmorrhage did not return. This large loss of blood seemed for a time to render the tumid spleen of less volume.

This gland, as before remarked, is very importantly concerned in the formation and disintegration of blood-globules, and if the chemical

constituents of the blood are changed, it cannot normally perform its office, and as a consequence must necessarily of itself become diseased. Its enlargement and loss of vital adhesion are its most common alterations.

ACUTE SPLENITIS.

There may be acute inflammation of the Spleen, as there may be acute inflammation of any of the other solid viscera, but the true sthenic type very seldom occurs, at least in this climate. In malarial countries it is not so uncommon, and more especially in tropical regions. When it is observed in this country it is generally referrible to the extension of the inflammatory process by continuity of structure and proximity of position, as when the serous coverings of adjacent organs and parts are inflamed; or it may be produced by external violence. From such causes it may obtain at any age. M. Huguier gives an example of acute splenitis in a child not four years old.

CAUSES.—In addition to the causes already named, sudden distension, and stretching of its fibrous capsule under the malarial influence; exposure to a lowered temperature after hot and sunny days; long and fatiguing marches; great bodily exertion, such as protracted journeys in damp and marshy districts; hæmorrhagic infarctions as connected with hyperæmia; emboli originating in left heart valvular disease; and the suppression of accustomed discharges as hæmorrhoids and the catamenia, have been regarded as the etiological conditions. Long says inflammation of the uterus has been found to be succeeded by acute splenitis. Hæmorrhagic infarctions occurring during the progress of infectious diseases sometimes constitute a cause. Intemperance may also be named.

SYMPTOMS.—According to Grottanelli, Bree, Craigie, and others, acute splenitis is ushered in by shivering and chilliness alternating with flushes. There is a sense of tension, weight, and dragging in the left hypochondrium; pains are felt deep in the side, sometimes of sharp and stabbing character, which radiate into the epigastrium, or round to the spine, or extend to the left shoulder, breast, and clavicle. The palms of the hands and feet become hot. Neuralgia, frequent respiration, an enfeebled condition of the mental powers, an altered state of the systolic aortic murmurs, and the liability to embolism denote this disease. Sir Joseph Fayrer told me he had been much struck with the tendency to the formation of fibrinous clots in the cardiac cavities, and that the distressing respiration produced by those depositions is in India sometimes witnessed. When the organ is very large the heart is put out of its position by the diaphragm being pressed upwards. A mechanical cause of embarrassment is thus given to the circulation. Sickness and vomiting may supervene, the ejected matters being a biliary mucous fluid and occasionally mixed with blood. Sometimes the blood vomited may be large, and when there is sanguineous extravasation

into the stomach the stools are necessarily darkened. There may be some hæmoptysis or epistaxis. Twining says that inflammation of the serous coat sometimes takes place without much enlargement of the viscus, and that the symptoms greatly resemble those of pleuritis. If the peritoneal covering of the diaphragm be involved, cough and dyspnœa are prominent symptoms. Thirst, loss of appetite, furred tongue, confined bowels, scanty urine, heat of skin, and flushed countenance obtain, and in the evening the general conditions of pyrexia assume more or less of exacerbation. Sometimes hiccough, tympanitis, diarrhœa, delirium, and exhaustion come on, and the patient will die in the course of a week or ten days. The pulse is quicker than natural, but its acceleration is not always in a ratio commensurate with the severity of the concomitant symptoms. The pulse may not exceed 90, and the temperature be only 100° F. even when the case is progressing to a fatal termination. Sudden and diffuse peritonitis may come on, when all the cardinal symptoms rapidly become more grave. Certain of the older writers have endeavoured to account for the comparatively slow pulse by attributing such peculiarity to the distensile and accommodating qualities of the organ, by which they conceived it to be less prone to vascular obstruction and blood stasis, the notable conditions of inflamed parts, and which so potently react upon the circulatory and nervous systems. The patient cannot lie on the right side, and whenever he attempts to do so the dragging pain is much increased. When purulent formations take place there are rigors and flushings, and a throbbing in the splenic region, and the patient lies partly on the back and partly on the side. In the worst cases of acute splenitis there may be black stools, these being voided unconsciously. In those examples which pass on to a favourable termination, there is the gradual mitigation of pain; the patient is by his feelings less restricted to one position in bed; the breathing is easier; the pulse and temperature begin to fall; there is not uncommonly a copious perspiration; deposits are seen in the urine; diarrhœa may come on; the tongue is more moist and less furred; sometimes there is some loss of blood by hæmorrhoids; and in females the catamenia may appear; the evening exacerbations are not so pronounced, and the sleep is more continuous. In the course of a few days after such decline of the more prominent symptoms the physical signs likewise indicate improvement.

DIAGNOSIS.—In all instances of inflammation of the spleen palpation and percussion should never be omitted. Indeed, these are the chief modes whereby we can arrive at any correct decision relative to the nature and extent of the disease. When the inflammation of the peritoneal covering has been established, the fibrous capsule and the substance of the organ also become affected; there is then some enlargement, and palpation will generally discover the lower edge of the organ ranging with or depending below the costal cartilages. The complaint may be distinguished from hepatitis from

what has been above said relative to the physical signs, and accurately observing the seat of pain; by the absence of jaundice and the colour of the excretions; from inflammation of the stomach, by the sickness not being a cardinal symptom; by pressure being borne at the epigastrium, and by remembering that idiopathic gastritis is very rarely seen in this climate. It may be known from pneumonia and pleurisy in the lower half of the left thorax by the non-existence of those stethoscopic signs so characteristic of the respective affections; it differs from nephritis from the locality of the pain, by its not following the course of the ureter, by there being no retraction of the testicle, and by the analytical and microscopical appearance of the urine; and from ordinary peritonitis by the clinical history and certain negative facts, by the state of the pulse, and the tenderness not being diffused over the abdomen. Its resolution is judged of by freer flow of urine, moist tongue, improved circulation, less pain, cooler surface, and the more natural appearance of the features.

TREATMENT.—In those cases which may be regarded as being of the sthenically acute type, when the vital powers are unimpaired, as evinced by strong and quick pulse, heat of skin, thirst, furred tongue, accelerated breathing, cough, and pain on hypochondriac pressure, local blood-letting may be employed. If the tenderness be not too great cupping may be had recourse to, but if the local pain be considerable leeches should be ordered. The part having been then well fomented, a large linseed-meal or bran poultice should be applied; this should be covered over with cotton-wool, and then a piece of oiled silk should be placed over, extending fully beyond the margins. The fomentations may be with poppy-head decoctions. In some cases terebinthinate epithems are of great service. When the acuter symptoms and the symptomatic fever are subdued, stimulating liniments, blisters, and moxas are of use. Aloes, antimonials, and neutral salts are at the first beneficial. Afterwards the compound extract of colocynth, the compound jalap powder, and various preparations of senna, scammony, or rhubarb are appropriate remedies. Mercurials should, except occasionally in union with purgatives, be avoided. When there is sympathetic vomiting the carbonates and bicarbonates of the alkalies may be administered. Dr. Hammond, an American physician, recently employed aspiration for the relief of softening consequent upon acute inflammation of the organ. The aspirator needle was introduced through the intercostal space between the ninth and tenth ribs, two inches behind the left axillary line, and on a level with the middle of the eleventh dorsal vertebra, when eight and a half ounces of dark grumous fluid were withdrawn. The patient was at once relieved, the pain being diminished, and the breathing becoming easier. And the man a full recovery. A carefully regulated diet and rest in the recumbent posture should also for some time be observed.

CHRONIC SPLENITIS.

There are many indications in common to both the acute and chronic forms of the disease. In chronic splenitis the degree or intensity of the affection is most varied. It is generally the complication of ague, and is most frequently observed in the malarious districts of the East. It is often a consecutive complaint, and is seen mostly in conjunction with intermittents and remittents, or as associated with hepatitis and dysentery. In the continued fever of this country it is occasionally noticed concurrent with or as the sequel of that disease. The more obvious conditions of its covert or low form of inflammation are sometimes preceded by congestion. And the acute inflammatory state may be succeeded by the chronic. In some instances the envelopes become inflammatorily affected, when degenerative products may in the course of time be found in the tunics, as the cartilaginous or ossific conversions; or greater or less amounts of purulent secretion may be formed in its parenchyma.

CAUSES.—The causes of chronic splenitis are those etiological conditions which have already been spoken of when treating of the etiology of splenic diseases generally. By far the most common cause which can be mentioned is the endemic influence, and most especially the malarial exhalations which are so usually given off in fenny districts and in tropical countries. In the East and West Indies, and in other of our colonial possessions, where intermittents and remittents are so commonly met with, this affection is very prone to occur, not only in the white but in the dark races, and particularly among young people, and in the children of European residents. The fluxionary hyperæmia to which this gland is subject in periodic fevers, and the repetition of surcharges of blood, induce a proneness to a low form of inflammation in its structures, and the inflammatory phenomena thus set up are often insidious and protracted. The more cognizable conditions of the sthenic or acute affection may as remarked become chronic. In the various forms of continued fever this organ may in consecutive manner become chronically inflamed, and in the relapsing type this observation more especially holds good. In the organic changes of other organs this gland sometimes becomes also chronically inflamed. In cirrhosis of the liver, and where from any other cause there is obstruction of the portal vein, such may be the case. Wherever circumstances may obtain which mechanically obstruct the hepatic circulation a low state of splenitis may occur.

SYMPTOMS.—The more prominent symptoms are a feeling of weight and heaviness in the left hypochondrium, which is aggravated by lying on the right side. There is uneasiness on pressure over the region. The patient describes the pain as dull, obtuse, and aching, and it extends, as Morgagni observed, towards the spine. There is a distressing sense of fulness and tension at the epigastrium.

which is more prominent and rounded than normal. The sleep is broken and fitful, and disturbed by unpleasant dreams; there is more or less of dyspepsia, and there is often a light-coloured, glassy tongue; and when the diaphragmatic covering is affected the breathing is hurried and shallow, as in the acute types; added to which there is a dry, teasing cough, and there are also anorexia, flatulency, torpid bowels, scanty urine, dry skin, and furfuraceous desquamation of the cuticle; and acceleration of the pulse comes on more towards the latter than the earlier stages. This, however, is not an invariable symptom. Bree says the pulse is slow during the earlier or congestive stages, and only becomes quick when the tunics are at length painfully distended; he also adds that the gland may for months be turgid without giving rise to symptomatic fever, and that a moderate degree of fever is indicative of an effort on the part of nature to resolve the disease. In the evening, or during the night, there is exacerbation. In this condition of the organ, blows, falls, and external injuries are apt to be followed by acute splenitis. When the complaint is of long continuance, when it passes into what may be termed the third stage, when remedies have proved inoperative, and when change of climate cannot be obtained, still graver conditions become apparent. There is then increased debility, the legs are smaller, the loss of flesh is more marked, convulsive asthmatic attacks supervene, and the enfeebled heart is exemplified by fits of palpitation which follow exertion. The organ extends below the false ribs, and often obliquely towards the umbilicus. The anæmia, blanched sclerotic, and tawny countenance proclaim augmented deterioration of the circulating fluids and depressed secretion, whilst the progressive emaciation, ascites, hectic, dyspnoea, singultus, vomiting, and diarrhoea usher in the fatal termination. Blood mixed with matter ejected from the stomach, or with the alvine evacuations, not infrequently occurs, giving temporary relief, and the sanguineous discharge would seem for a time to ward off the mortal event. Such are the main symptoms of chronic splenitis, and more especially as the affection prevails in malarious countries.

DIAGNOSIS.—When the patient complains of a dull, aching, dragging weight at the base of, or below, the left posterior thorax, with pains extending through into the back or radiating up into the left shoulder; when he lies on the left side or with some tendency to reclination on the back; when there is the clinical history of a residence in some aguish district, when the features look dusky, yellowish, and anæmic, when the lips and gums are bloodless, or when these symptoms have come on gradually, chronic splenitis may be suspected. Physical examination will pretty certainly confirm the suspicion. When the disease obtains, palpation and percussion discover enlargement of the viscus. The normal lines of dulness are in varying degrees exceeded, and the free border of the gland may be felt at or even below the costal edge; nor should it be

forgotten what has in this article already been insisted upon, that the viscus in health cannot be touched with the fingers. The patient in chronic splenitis bears examination much better than he can bear manipulation in the acute form. He generally can alter his position in bed, move the trunk, and make full inspiration and expiration without any great increase of pain. He does not complain of those stabbing and lancinating pains which are so symptomatic when the serous and fibrous envelopes are inflamed. Dulness, heaviness in the side, and aching, are the terms the patient uses as descriptive of his ailments. When dyspnœa and pleurodynia are present, it is presumptive that the upper part of the organ is more particularly enlarged and the seat of disease, and that pressure on the diaphragm has affected that organ. Chronic splenitis, with enlargement, which occurs as the rule, may be known from pleuritic effusion by negative as well as positive facts. There is not the intercostal stretching and bulging, nor that smooth rotund configuration of the chest-wall, which denote the accumulation of fluid. Percussion in effusion elicits an absolutely dull, dead sound, which to the practised ear is markedly different from the kind of dulness produced by any other physical and pathologic changes. Higher up there may be friction sounds or ægophony. Again, in pleuritic affections there is the characteristic cough in the earlier stage of the complaint, and when there is the accumulation of liquid the dyspnœa is a notable condition. In pneumonia the dulness is not so absolute; it extends over a larger area, the breathing is quick and short, the countenance often has a venoid hue; the aspect, pulse, and temperature point to the pneumonic nature of the ailment. In inflammation of the peritoneum the decubitus, pulse, abdominal distension, the more extended tenderness, the drawing up of the legs, and thoracic breathing are significant of peritonitis. The peritoneum may become locally inflamed in splenitis, but in such cases the tenderness on pressure is circumscribed; there is not much abdominal distension, and the patient can turn towards the side, and he does not lie with his legs drawn up. The pain on pressure is confined to the left side. In nephritis the ordinary urinary tests and microscopical examination are our guide. In encysted kidney accurate manipulation will enable us to discover the one affection from the other. Ovarian tumour can hardly be mistaken for the complaint. Ovarian enlargement is first felt lower down in the abdomen, and there is generally resonance between the costal edge and the ovarian dulness. When there is a purulent collection in the splenic substance, the formation of matter is decided upon by the tenderness on examination; there are rigors, hectic towards evening, and in the course of time fluctuation may possibly be detected. Impacted colon may be judged of by its irregular contour, the sulci which can generally be felt, and a large enema either removes the tumour or alters its configuration. Malignant growths of the omentum are harder, flatter, broader, their edges less defined, and the cachexia and clinical history will conduct to the correct conclusion.

TREATMENT.—The treatment of this disease must needs somewhat differ in each individual case, as much will depend upon a variety of coexistent circumstances. When there is great and manifest enlargement, when the pain and aching are considerable, when it is believed there is some peritoneal tenderness, and when the affection occurs in a person of strong and unbroken constitution, leeches may be applied, and these should be followed by a large linseed poultice. When local blood-letting is not had recourse to, and as it seldom will be required, fomentations with strong poppy-head decoctions are soothing and beneficial. A large bran or linseed-meal poultice applied in a flannel or muslin bag is excellent practice. The poultice should be covered with cotton-wool, and over the latter should be spread a piece of oiled-silk sufficiently large to extend beyond the margins. These poultices should be frequently repeated, and never allowed to remain on when they are becoming cool. When the symptomatic fever is subdued, stimulating liniments, such as the soap, turpentine, and camphor liniments of the *Pharmacopœia*, or these may be combined, and the opium and belladonna liniments may be added. Terebinthinate epithems and sinapisms are often of much service. Some authors recommend drastic purging, to be for some time continued. In the chronic inflammatory state there is no doubt that purging is one of the most successful and best remedies. Hippocrates and Celsus had observed the curative tendency of dysenteric complaints in splenic disease, and this salutary effect of increased action of the bowels can be well understood when considered anatomically and physiologically. Engorgement of the splenic veins produces vascularity in the vessels of the descending colon and rectum, because it engorges the inferior mesenteric, from which those parts of the alimentary canal derive their blood, and the hyperæmic mucous membrane constitutes the proximate cause of the dysenteric symptoms. Aloes, antimonials, and neutral salts, by determining the blood to the pelvic and abdominal vessels, produce the best results, and whenever the organ is relieved by nature or by art it is mostly by the vessels of the lower viscera receiving more than their normal quantity of blood. Certain Indian writers are of opinion that in enlargement of the spleen a prompt antiphlogistic treatment should at once be employed. And they give it as the opinion founded on extensive practice that local blood-letting, epispastics, or counter-irritants, ought to be applied, and that brisk purgatives should be combined with such treatment. If antimony and salines be too long used, debility ensues. Recourse may then be had to the compound pill or the extract of colocynth, the compound jalap powder, and the various preparations of scammony, senna, and rhubarb. To act on the radicles of the portal vein is to relieve splenic as it relieves hepatic congestion. The combination of calomel may be advisable when there is a turgid condition of the liver. The employment of mercury, otherwise than in union with purgatives, cannot be too strongly reprobated, as all authorities are averse from its use except

in the manner described. Lamentable effects have resulted from the way in which mercurials were formerly administered in splenic complaints; and from what has been said in this article relative to that dyscrasia of the fluids so commonly the accompaniment of the diseases of this organ, it is obvious that mercury is not only an unsuitable but a very deleterious agent. Some Indian writers have drawn terrible pictures of its ravages, and are most emphatic in its denunciation. A cloth dipped in dilute nitro-hydrochloric acid, placed over the splenic region, and then covered with an emollient cataplasm, is a means for adoption. The nitro-hydrochloric bath in the advanced and improving stage of the disease will expedite recovery.

The sulphate and tincture of the perchloride of iron in union with purgatives, more particularly the aloetic preparations, have been, and deservedly, lauded. When there is chronic splenitis with enlargement, amenorrhœa, and chlorosis, iron in some form should be given. Twining speaks of what is termed the splenic mixture as prescribed in India, which consists of jalap, rhubarb, calumba, ginger, cream of tartar, and sulphate of iron. The nitric and hydrochloric acids with infusion of chiretta constitute a good medicine. A sea-voyage and change of air will often expedite the cure. M. de Parville has recently propounded the idea that chalk may be regarded as prophylactic, if not as a more absolute remedial agent, in splenic complaints. It was observed that during the prevalence of a splenic disease which affected sheep and cattle, that those animals which licked white-washed walls had in a great measure an immunity from the complaint. This effect of the carbonate of lime requires, however, in the human subject more evidence than has hitherto been adduced. Those who come back from India for splenic disease should not return until after an absence of three years.

DISEASES OF SPLEEN IN CHILDREN.

Lesions of this organ in children are by far most commonly seen in those who have lived in low and damp situations, or who have been brought up in malarious districts and tropical climates; we sometimes, however, meet with splenic diseases in these little patients in this country, and more especially in dispensary and hospital practice, when poor and insufficient food, bad ventilation and humid houses, have exerted a predisposing effect. Infants of a few months old sometimes have enlargement of this viscus, but in such instances the enlargement can hardly be referred to those more general and extrinsic conditions which so prominently enter into the etiology of splenic affections in the adult.

CAUSES.—The causes of the morbid changes in this gland in children and the young are as the rule malarial emanations. In aguish parts of the country, the kind of complaints now more particularly

considered are not unfrequently seen. In infants protracted lactation will, when occurring in addition to the more generally recognised causes, predispose to splenic ailments. But these maladies are by far most usually met with as the accompaniments and sequels to intermittent and remittent types of fever. In certain affections of the liver which prevail amongst children the Spleen is apt to take on a congestive form of disease. The portal circulation being obstructed, fluxionary hyperæmia of this viscus may occur, and hyperplasia of the cellular elements at length take place. Quite independent of the malarial influence, the disease now known as leucocythæmia may come on in infancy and childhood, the causes of which are to be regarded as constitutional and not owing to unfavourable hygienic circumstances. In some instances, in children, the cause of its pathologic changes is degeneration of the walls of the vessels and the cell elements of the pulp, which go to form the lardaceous change, like to the lardaceous change in the liver. It may be in association with tuberculosis. In rachitis and scrofulosis a similar diseased mutation occurs. In hereditary syphilis this organ may present that amyloid degeneration which is now known to be so characteristic of this specific disease. When the syphilitic taint has been the cause, ossification seems to have been arrested; the anterior fontanelle is large; there is a loss of flesh, which gives in infancy the unseemly and decayed aspect of old age; the skin is yellow, waxy, and shrivelled; the belly is often tumid, the joints look large, and often some intercurrent affection, as pneumonia, bronchitis, cerebral effusion or diarrhœa, relieves the little patient of his sufferings.

SYMPTOMS.—The history of the case, and more especially the particulars relating to previous residence, are facts of most importance in forming our decision relative to the real nature of the malady. In children and the young the pathologic accompaniments more rapidly come on than in adults. There is in early life more functorial activity in the organism, and more demand for those conditions which are favourable to nutrition and growth than in after years. Hence, in the former *cancrum oris*, sloughing necrosis of the bones, hæmorrhage, effusions, and anasarca are more common. The physical signs should be carefully noted. When the affection is marked, the little patient lies on or towards the left side. Percussion discovers an increased area of dulness, and palpation detects the depending organ on or below the costal edge. The initiatory symptoms are restlessness, peevishness, anorexia, sleeplessness, and a disregard for wonted amusements. There is a loss of flesh and strength, the child becomes pale and sallow, the lips and tongue look bloodless, and the conjunctivæ are blanched. The skin is harsh, hot, and dry, the pulse often quick and feeble, and there are giddiness, headache, and palpitation. Pain is readily produced on pressure below the false ribs, the knees are often drawn up, and the trunk, as the little patient lies on his left side or towards the bed,

is curved. The bowels are generally costive, and the urine is pale, and there is an obvious increase of the pyrexial symptoms towards evening. Hectic, dyspnœa, ascites, diarrhœa, and sometimes œdema of the legs, and a greater or less degree of anasarca, supervene towards the end. In rickets, scrofulosis, and in leucocythæmia, the organ is large and depending, and it becomes the largest in the last-named complaint. In these affections the patient's aspect is anæmic, yellow, and waxen, but the symptomatic fever is much less, or may not obtain, nor are there the evening febrile exacerbations. Not unfrequently the liver is also large, so that the lines of dulness on both sides of the little sufferer are much extended. When the hepatic affection is marked, the superficial veins of the abdomen are apt to become full and turgid. With these forms of splenic disease there are petechial stains on the surface, and grave or even fatal epistaxis or hæmatemesis may come on. In syphilitic cases, from hereditary taint, when there is splenic enlargement, other and co-existent symptoms are observable. Coryza, cutaneous eruptions, and ulceration about the angles of the mouth are not uncommon. A yellowish ichorous discharge comes from the infant's nostrils, the lips are fissured, the Meibomian glands secrete pus, and often red, coppery spots can be seen on the skin. In such instances gummatous deposits are apt to be formed in either of the other solid viscera, as well as in the Spleen. Dr. Churton saw an infant aged sixteen months, whose spleen filled the left abdomen. The blood contained a large excess of leucocytes, and the red corpuscles were small and ill-formed. The lips were very white; the face had a yellowish earthy colour; the child's manner was preternaturally calm; it was not emaciated. There had formerly been some slight evidence of a syphilitic diathesis; therefore, very small doses of liquor hydrargyri perchloridi, iodide of potassium and tincture of bark, had been given. Under this treatment the spleen in seven days became decidedly smaller, and the child had improved in appearance.

DIAGNOSIS.—The rules to be observed in diagnosing splenic affections in children are much the same as those to be noticed in judging of the maladies incident to this organ in the adult. The clinical history aids in our decision, and the fact of residence where ague has prevailed at once points to the probable nature of the complaint. The physical signs in the child are easier of interpretation, more distinct and definite than they are in those who are older. The abdominal and thoracic walls are thinner and more resilient, and the internal parts can with less difficulty be felt. By careful examination of the chest, diseases proper to that cavity can with much certainty be excluded. Palpation, as above remarked, finds the edge of the gland, and accurate percussion defines the extent of its increase. Jenner says, "If the fingers of the right hand are placed under the child's twelfth rib on the left side, and the fingers of the left hand a little to the left of the middle line, between the navel

and the ensiform cartilage, and a pressure being made backwards and forwards, the Spleen may be readily felt." The front edge is more defined than the front part of a large kidney, and the dulness in a large kidney extends fully up to and under the spinal muscles. The tumour of psoas abscess does not reach so high up either as the Spleen or a large kidney; it is circular, and the tenderness on digital examination is very great, and as the disease progresses the secretion gravitates downwards. From what has already been said it will be remembered that the enlargement of this viscus is very generally the accompaniment or sequel of intermittent or remittent fever, when the symptoms of these respective types will without difficulty be recognised. In abscess there is more localized tenderness over the splenic region, there are rigors, and towards evening the little patient becomes flushed, hotter, and more restless. In leucocythæmia the organ may become so large as to apparently half occupy the abdominal cavity; there is then a markedly anæmic condition, and the abdominal veins are sometimes distended and tortuous. Syphilitic enlargement will be decided upon from what has already been stated when describing the various symptoms of the diseases of this viscus.

TREATMENT.—The treatment of splenic diseases in children should be on those more general and recognised principles which are to be observed in the adult, and which have already been given in this article; and also, it need hardly be remarked that much exactness is always needed in prescribing for infants and young children, nor is it always safe to depend upon the doses which are arbitrarily fixed in posological tables; for it must be borne in mind that susceptibility in the young, with regard to remedies, is not unfrequently very pronounced. The duration of the ailment, and the general strength of the little patient, will greatly determine the kind and amount of agent to be employed. If the child should evidently labour under acute pain; if the pulse be quick, the respiration accelerated, the temperature high, the skin hot and dry; if additional distress be caused on the movement of the trunk, or the inclination of the body towards the right side, and if a long breath cannot be drawn, and the urine be scanty, the bowels confined, the tongue coated, and there is much thirst, there will doubtless be more or less of acute inflammation. Not only may the fibrous and serous covering of the gland be inflamed, but the inflammatory action may have extended to the diaphragm, or there may be more or less of peritonitis. Fomentations and poultices should then be very sedulously applied, and if the acuter symptoms do not yield to their employment, leeches may carefully be used. Purgatives of senna, rhubarb, or some of their respective preparations, or some of the neutral salts, should be given. The hyperæmic distension by undue stretching excites the inflammatory phenomena, and to lessen the surcharge of blood in the gland is our aim; hence by acting on the bowels, and thus unloading the venous radicles of the portal vein, the splenic turgor becomes in an

indirect manner lessened. A febrifuge may be given composed of the solution of carbonate of potash saturated with citric acid and flavoured with the syrup of mulberries; or the nitrate of potash dissolved in water, made palatable with the syrup of oranges or the syrup of lemons, form another mixture which children will readily take. The acetate liquor of ammonia with some agreeable addition is a good medicine. When the symptomatic fever has declined, quinine is then imperiously demanded. In the chronic, sub-acute, and more congestive forms of the affection, purgatives with senna, rhubarb or scammony, some preparation of aloes, in conjunction with iron and sulphuric acid, should be prescribed. The nitric acid bath, or nitric acid applied locally (always taking care that this drug should, when thus rendered available, be sufficiently diluted), are not unfrequently of much service. When the complaint has evidently resulted from periodic fever, removal to another district or another climate is a desideratum. In the leucocythæmic form iron is the remedy upon which the most reliance can be placed. In splenic enlargement of infants caused by hereditary syphilis, small and continuous doses of the ordinary pharmacopœial preparation of mercury and chalk, and afterwards the iodide of potassium, constitute the best and most effective treatment. In all the varied forms of splenic diseases in children much attention should be paid to the diet. Articles of food should be selected which are light and nourishing, such as are blood-making and digestible. In winter and cold weather flannel underclothing is of great importance.

ABSCESS OF SPLEEN.

Abscess of this organ is an affection which not unfrequently ends fatally. It is sometimes very insidious, taking place without any other symptoms than those of bad health and wasting. Upon inquiry it is generally ascertained that the patient has been subjected to the endemic influence of periodic fever, and that there has been pyrexia. It may be the result of acute splenitis, but it is more frequently caused by the sub-acute and chronic forms of inflammation. When the pus is in the centre of the gland, its diagnosis is most difficult, and it is only when it painfully presses upon the membranes that it can be detected. Shiverings, hectic, evening exacerbations, the general irritation caused by purulent absorption, and restricted secretions suggest its presence. Abercrombie gives an apt illustration of its covert progress in the case of a gentleman who for six months pined and wasted away without the exhibition of any local symptoms, save an insignificant catarrhal affection, and it was found on inspection that this organ contained a large abscess. Craigie bears like testimony, and observes that the most perplexing part of the semeiography and symptomatology is, that these collections give no evidence of their presence until by their size they

painfully stretch the viscus and press upon surrounding organs. Heusinger and Schmidt say the same. Twining and Voight assert that splenitis rarely runs on to suppuration in India. When pus is formed in the organ, it is almost always the consequence of inflammation. Pus may be collected, however, in this viscus as it may be collected in the liver, in consequence of injuries in remote parts and when pyæmia is present in the system. Nor does the suppurative process exert that deleterious and destructive effect upon the structure of the organ which might be supposed. The filamentous tissue may be bathed in pus for a long time without injury. The suppurative formation in one or more sacs may be borne for a considerable period, and the parietes of such sacs at length become fibrous, cartilaginous, or even osseous, and the contents may, by partial absorption, be rendered a greasy, calcareous pulp. Much more frequently the inflammation by peripheral pressure of the sac extends towards the surface when the investments give plainer indications of lesion. There may then be adhesion to the diaphragm or abdominal wall, or to the stomach, colon, or ileum. Fluctuation may be felt and external pointing observed, just as these conditions are apt to be presented when there is abscess in the liver. The matter may be discharged in various ways. It may be poured into the abdominal cavity, when flagrant and fatal peritonitis rapidly follows. It may by cohesive inflammation and ulceration be evacuated into the stomach, when sickness and vomiting are produced. In like manner it may pass into the colon, or into the pelvis of the kidney, and be voided by the rectum or the bladder. Or the ulcerative process consequent upon pressure may be produced in another direction, and it may go through the diaphragm into the thoracic cavity, giving rise to pleuritis; and in this way in some rare instances the pus has been transferred into the bronchi and coughed up, when it has closely simulated empyema. Mantell not long ago recorded a case in which the matter burrowed into the left lung and was expectorated; and on examination of the organ after death it was discovered to be an empty sac, only containing a very small quantity of dark brick-coloured fluid, which sampled with that expectorated. When the pus is carried into the kidney, the symptoms of uræmic poisoning are rendered in greater or less degree apparent. When the secretion seeks an external exit, the pointing may be anywhere between the ileum and the costal margin, or it may be between the umbilicus and the lumbar muscles. I have known the matter burrow through the abdominal wall and perfect recovery succeed. Grottanelli and Raikem record instances of spontaneous outcome of the matter through the abdominal parietes.

Reference has already been made to embolic infarction, caused by cardiac disease, and the localized inflammation which such event is liable to institute in the gland. The abscesses which follow are usually not large at the commencement, but they are apt to coalesce, and thus from this cause we sometimes meet with a considerable

collection of pus; they give rise to perisplenitis, seldom to general peritonitis, and the capsule covering the subjacent deposition becomes thickened, and its peritoneal investment is rendered vascular and opaque. At an earlier period of the formation of these spots, a dark and congestive zone surrounds the embolized part, and the process of softening is first discovered in the centre of these cuneiform deposits. When of pyæmic origin, or resulting from the secreting surfaces of surgical operations or suppurative wounds, the tendency to soften and assume the conditions of abscess is more marked than when the infarction is from pieces of lymph being carried in the circulation from heart disease. Sometimes hydatids produce abscess in this organ.

SYMPTOMATOLOGY AND DIAGNOSIS.—It has already been stated that the symptoms of suppuration in this organ are uncertain and imperfectly pronounced; just as we know such uncertainty to obtain in hepatic abscess. There may be little or no pain, as is generally the case when the pus is formed centrally, and without the involution of fibrous and serous investments. There may not be either nausea or vomiting, if no irritation be given to the branches of the vagus. Before fluctuation can be absolutely felt there is always room for doubt as to the presence of the suppurative process. When fluid in the viscus is diagnosed, rigors and flushes and copious perspiration are the common objective symptoms. There is not unfrequently a hard, dry cough, caused by diaphragmatic pressure, and the pulse is usually full, quick, and compressible. If, however, the peritoneal coat become inflamed, the pulse, instead of being large, acquires the characteristics of the pulse of peritonitis, by being of less volume and firmer under the finger. Pain in the left shoulder is not uncommon, and this fact was long ago pointed out by Grottanelli. More than half a century since he asserted that in splenic abscess there is pain in the left scapula and left shoulder. There is often aching behind the acromion process, and this dull pain may extend to the chest and up behind the neck. The pain in the side may remain for a considerable period stationary; it may increase or it may decline. If the matter do not quickly accumulate, the amount of pain remains the same. When it becomes augmented, this symptom may go on to be excessive. When there is absorption the pain gradually declines. When the matter makes its escape into one of the hollow viscera or externally, the mitigation of the pain is marked and sudden, and it may be at once abolished. The secretion may pass into the cavity of the peritoneum. Grottanelli, in making reference to such catastrophes, says:—“*Corripitur longum, post iter, pulvisco cælo, pedibus velociter emensus, febris specie catarrhali, typo quotidianæ intermittentis, quantum circa diem splen acriter dolore et intumescere cæpit. Tunc nausea, vomendi nisus, sinistri humeris dolor, tussicula, sitis multa exsurgunt.*” When the matter passes into the serous cavity the augmented and alarming symptoms are marked and immediate. A great shock is given to the system by

this grave and very commonly fatal event, the phenomena of which are readily interpreted. The pulse becomes quick and feeble, the features look pale and sunken, the surface is often bathed in a cold, dewy perspiration, there is a tendency in the extremities to become cool, the decubitus is on the back, with the knees drawn up, and the respiration is thoracic. After the supervention of these alarming conditions the mind is often clear, and it may remain unclouded to the last. With these grave changes the splanchnic nerves become potently impressed, the deep cardiac plexus and the branches given off to that plexus by the pneumogastric become paralysed, and death eventuates from gradual arrestment of the heart's action. By attention to those rules which have before been given in this article relative to diagnosis, a mistake could hardly be made in deciding as to the question of the lesion being situate in the organ. Collections of pus sometimes form in the abdominal walls, and such might take place over the splenic region; but in such instances the tumefaction is more superficial, and careful manipulation discovers it to be located in the parietes. In the course of time there is a brawny feel to the integuments beyond the limits of purulent deposit; they feel hard and tight, and the lines of dulness are ill defined. Again certain negative facts come to our help in forming a judgment on the point. In parietal abscess appearing in the place now named, it must be held in mind that the characteristic conditions of splenic disease would be wanting. The clinical history would tell of no endemic cause; there would be no account of intermittent or remittent fever; the peculiar cachexia of miasmatic poisoning would not be apparent, palpation would not discover the dependent edge of the organ, and the patient would be able to lie on the right side. Empyema might burrow and point over the situation of the Spleen, it might seek an exit as I have known it between the crest of the ileum and the costal edge, but the common cardinal and physical signs of pleuritic effusion would be our guide. The tumour of psoas abscess is not so high up as splenic tumour caused by suppuration, and pressure over the psoas muscle is likely to produce bulging of the fluid in the groin. Renal abscess and encysted kidney give indications by testing the urine. Leucocythæmic enlargement of the Spleen importantly differs from splenic abscess. The hardness of the first-named affection, the falling downwards into the pelvic cavity, the absence of rigors, flushes, and perspirations, would indicate the true nature of the malady. Malignant growths in this situation would be readily excluded by the calling to mind many negative as well as positive facts whereon we base our conclusions relative to the presence or absence of carcinomatous growths.

PROGNOSIS.—All authors and the best authorities are agreed that abscess of the Spleen, whether coming on from malarious causes or of pyæmic origin, is always fraught with great danger. In many so-called recoveries it was, perhaps, by no means absolutely certain that a suppuration had existed. In some few cases it is possible that

absorption may take place, and the patient get well, just as this event, in exceptional instances, may follow purulent formations in the liver. There are various cases of a favourable termination recorded when the matter has by ulcerative absorption found its way into one of the hollow viscera, or when it has burrowed through the diaphragm into the bronchi; but the more frequent result is the catastrophe of the fluid's extravasation into the cavity of the peritoneum. It may, as before remarked, find an outlet through the parietes, but this mode of its escape is very rare, and even when it occurs, death generally ensues from protracted secretion, and the irritating and debilitating effects of a large suppurating cavity. When from pyæmia, it may almost be said that abscess of the Spleen is always fatal.

TREATMENT.—The treatment required in this affection is very much the same as the treatment required when the same kind of pathologic change takes place in the hepatic viscus. Both being solid organs, both contained in the abdominal cavity, and both being influenced by like impressions, it can be easily understood how they are subject to similar morbid processes. If the pain come on suddenly with accelerated pulse and exalted temperature, and the patient can with difficulty take long inspirations, such would infer inflammation of the fibrous and serous coverings. With these symptoms in a case occurring in this country, or in a patient who is a European, and who has not been long resident in the tropics, and whose constitution has not been broken down by protracted exposure to the malarial influences, by intemperance, or other debilitating causes, leeches may be applied. Warm fomentations should also be used, and large poultices placed over the part. The latter may be made of bran or linseed-meal, or partly of linseed-meal and partly of bread. They should be placed into a muslin or flannel bag, covered with cotton wool, and then a piece of oiled-silk should be spread over the edges. By this mode the heat and moisture are much longer retained, and thus the necessity for the local application being repeatedly changed is avoided, and consequently the patient is less inconvenienced. When there is symptomatic fever, saline purgatives, diaphoretics, and diuretics should be prescribed. The aperient may be the sulphates of soda or magnesia, Pullna water, the citrate of magnesia, or bitartrate of potash. A dose of the Carlsbad salts in half a tumblerful of soda-water sometimes answers very well. When the patient's strength is much reduced, the preparations of senna, rhubarb, or aloes may be given, and to any of these a small quantity of podophyllin may be added, whereby a bilious evacuation is promoted. In order to maintain an action on the skin, the acetate liquor of ammonia, in combination with the nitrous spirits of ether and camphor julep, may be prescribed. The nitrate of potash and the bitartrate of potash will keep up the function of the kidneys. When there is gastric derangement with flatulent eructations, the alkaline mineral waters are to be com-

mended, particularly those of Vals, Vichy, and Ems. With the decline of the symptomatic fever quinine should be given in full doses, and most especially when the primary disease is of endemic origin. It ought also to be conjoined with sulphuric acid. When there is much pain, harassing cough, as there may be by implication of the diaphragmatic surfaces, some of the preparations of opium may be needed. It is always desirable that the patient's strength should be husbanded by continuous and refreshing sleep. Upon opiates the most dependence can be placed. In some instances the bromide of potassium, or ammonium, or the chloral hydrate, may be sufficient to calm the nervous system and give a good night's rest. It may be repeated here what has already before been insisted upon, that mercury in any form should be avoided, either as an internal remedy or as an outward application. When the abscess points externally, it is generally better to allow nature to effect an opening than to have recourse to the knife. There is then no injury done to the walls, and no shock given to the system. And where the matter is being spontaneously evacuated there should be no squeezing or pressure, and large and soothing cataplasms should be kept constantly applied. Under this plan of treatment the matter will escape in slower way, but it is a more desirable mode of its evacuation. Harm is generally done by instrumental interference. When an artificial opening is made, air enters the sac, and fresh inflammation is liable to be excited. A puncture can hardly be made without hæmorrhage into the splenic substance. It must, however, be conceded that a hard and fast rule on the point in question is not to be contended for, because in certain instances there might be the danger of expectancy. The continuous and unremitting augmentation of the fluid would jeopardise more and more the giving way of the sac, and if the rupture were into the abdominal cavity, that event, as it has repeatedly been observed, means death. If there were a projecting fluctuating tumour, with a pointing inflammatory blush, and it appeared that the integuments were resistive, a small trochar might be introduced, or Bowditch's aspirator might be employed. The canula of the trochar might, if its presence produced no irritation, be for a few days left in, or a pledget of oil lint be placed in the orifice, and the instrument after an interval introduced. A large and moist poultice should after the operation be applied, and a full dose of morphia or Battley's liquor opii sedativus be immediately given. With regard to food, such articles of diet should be selected as are nourishing and easily digested. Strong beef-tea, which might be thickened with corn-flour, sago, tapioca, or rice; veal and hain broth make an agreeable change; and game and chicken panada are likely to be relished by the patient. Good milk, if the patient can take it, is always desirable, and it often agrees better with lime-water. It can be given in soda-water, and occasionally in champagne it suits very well. Light sherry, claret, burgundy, or marsala are perhaps the best stimulants.

CONGESTION AND HYPERTROPHY OF SPLEEN.

That congestion of this viscus may continue for a protracted period without giving rise to inflammation is unquestionable, and, as before observed, its distensile qualities favour the one and not the other condition. It is referrible to mechanical obstruction, to fluxionary hyperæmia, or to a dyscrasic state of the fluids, though it may be produced by impediment to the circulation of the vena porta or cardiac disease. As the rule, its hypertrophy is not owing to mechanical causes; not unfrequently in heart disease, or cirrhotic and nutmeg-liver, the organ is found smaller than normal. In acute endocarditis, which implies blood disease, splenic hypertrophy is often produced. Wilks and Moxon assert that in ten cases of ulcerative endocarditis its average weight was so much as twenty-five ounces, and these authorities say that in ischæmia, without poisoning of the circulating fluid, and where inflammatory deposits did not exist, the gland was generally rather under than over weight. Its far more common cause, however, is the malarial influence, and those blood changes which miasmatic emanations engender. Wilks and Moxon say its hypertrophy when considerable is due to disease of its texture or of the blood. Between the blood, when contaminated with miasmatic poison, and this viscus there is some special and peculiar relation. Mere pyrexial exaltation of temperature is not the cause of its enlargement. There must be in addition some absolute and sanguineous change. The accession of its hypertrophy may be sudden or slow; if the former, the pain is urgent, and if the latter, there may be no pain. Vascular engorgement is more or less rapid, according to the injury which the constitution has received from the climate and the antecedent attacks of periodic fever which the patient has at varying times undergone. In temperate climates this pathologic state is of a passive character, being by no means so broadly marked as in tropical regions, where intermittents and remittents prevail. The hyperæmia may be temporary, and only cognizable during the cold stages of an ague; but if the vascular turgor be continually repeated, the fibrous structures and the proper parenchyma become hypertrophied—there is hyperplasia. Whether the unusual accumulation of blood depends upon increased action of the arteries, or on inability of the veins to remove it, is a question not decided, but the results are the same,—stasis being effected, enlargement must follow. In aguish districts it is not uncommon for persons to have splenic enlargement for many years, and die from other diseases; and it has been stated that individuals have had hypertrophy of this organ through life. Haller and Liecutaud mention such cases.

Often it must needs be an arbitrary distinction between congestion and a low and an ill-defined inflammation, knowing as we do by what insensible gradations these respective conditions pass from one into the other. Baillie says there may be congestion with

healthy structure. This, however, will depend much upon the degree of the hyperæmia. Craigie believes its increase of volume to be an incipient morbid state, which will progressively terminate in another morbid state. Primarily, simple congestion may eventuate in inflammation, and congestion and hypertrophy stand in relation of cause and effect. An often-repeated afflux of blood not only mechanically distends the organ, but conveys an abnormal amount of those assimilative materials which produce excess of nutrition, and consequently abnormality of the tissues. The effects of such sanguineous afflux are in other ways apparent. Hyperæmia in an organ is succeeded by impairment of its functions, and the sum of such impairment stands in just correlation to the amount of hyperæmia. If, then, the office of this gland be the elaboration of the formative materials of the blood, the evolution of an albuminous plasma from which the germs of the blood-corpuscles are derived, and, too, according to Kölliker, the dissolution of the old and effete corpuscles, the morbid enlargement of this organ must necessarily have a deleterious reaction upon the entire volume of the sanguineous fluid, and also upon the general powers of the constitution; hence it becomes explicable why congestion and hypertrophy are associated with pallor and sallowness, diminished vital action, and all the debased conditions of anæmia.

SYMPTOMS AND DIAGNOSIS.—When the congestion comes on suddenly the subjective symptoms are more pronounced than by mere dulness, aching, and dragging in the side; there may be in addition absolute pain, which is accompanied by more or less of febrile phenomena. There is a complaint of fulness and uneasiness under the left costal edge, and moderate pressure confers the feeling of soreness and tenderness; there is often some cough and inability to lie on the right side. Aching of the shoulder is another fact not uncommonly mentioned, and not unfrequently the stools are very dark, evidently malænal, when the urine is pale. The digestive and assimilating functions become impaired, the epigastrium is rendered smooth and rounded, and often there are eructations and flatulency. Upon investigation it will generally be discovered that there is an unfavourable state of the constitution. The conditions more distinctive and observable of the malarial influence are in most cases discernible. In the more chronic examples the dull, dead, puffy facial expression, the pale conjunctiva, blanched lips, gums, and tongue, unmistakably bespeak the anæmic change. Loss of flesh and strength are the common accompaniments, and the tendency to hæmorrhage attests the morbid alteration of the blood, and the want of nutrition in the capillary walls, which such alteration has produced. The skin is often cool, the pulse slow and compressible, and the temperature not more than the normal standard. In cases of long standing in which the organ has become hypertrophous, it often happens that the lymphatic glands are large, more especially the submaxillary, inguinal, and axillary, which is a co-existent

pathologic change that can readily be understood from what has already been said in a foregoing part of this article. Niemeyer thus accounts for this symptom of lymphatic enlargement :—"When the cells formed in the intertrabecular spaces of the Spleen, or in the cells of the lymphatic glands, are retained in any way, and are not normally borne along by the blood and lymph, they accumulate in these places; the Spleen or the lymphatic glands, as the case may be, swells up and the blood becomes poor, as the used-up blood-corpuscles are not replaced by others. If the obstruction to the passage of the young cells into the circulation be removed, the growth of the Spleen and the lymphatic glands ceases, and the blood is gradually improved by a sufficient supply of young cells, even if the enlarged Spleen or lymphatic glands do not increase in size." The facts to be observed in diagnosis are very similar to those enumerated under the head of Chronic Splenitis; ordinarily, congestion, as before insisted upon, is very generally the prelude to those more absolute morbid changes which constitute the inflammatory process, and it thus may be a mere arbitrary distinction which defines where the one state terminates and where the other state begins. In such instances the absence of febrile phenomena would be a weighty negative fact, influencing our decision. When the organ acquires increase of size, as the concomitant or sequel of one of the types of continued fever, the state may be regarded as that of mere congestion. The hypertrophous enlargement comes on more insidiously, the hardness is more proclaimed, nor is there so much tenderness to the touch, and investigation will mostly discover the malarial cause, and if such be not the case it will generally be found that there has been a foregoing hepatic disease which has produced organic obstruction to the portal circulation. The general appearance and the constitutional circumstances should always be carefully reviewed in the endeavour to arrive at diagnostic correctness.

TREATMENT.—When the history of the case points to malarial causes, the speedy removal of the patient from endemic influences becomes of course the first recommendation. Quinine and the various preparations of Peruvian bark are also to be sedulously taken. MM. Caron d'Annecy, Balby, and Piorry place the most reliance on cinchona. The removal to a more healthy climate would doubtless often suffice, but the cure would be unquestionably aided by the specific medicine. In the more active examples of congestion, when there is sharp pain, shallowness of breathing, and considerable distress, those means may very properly be had recourse to which have above been given when describing the treatment in chronic splenitis. The secretions and excretions should receive our attention, and the depurating organs be maintained in active function. Cholagogue aperients by freeing the hepatic system have a good indirect effect on the gland. The venous radicles of the portal vein should, by salines, the decoction of aloes, by senna, rhubarb, or

scammony, be acted upon. Tonics such as gentian, quassia, calumba, with occasional aloetic and myrrh pills, are effective, and the sulphate of iron, or the tincture of the perchloride of iron, should in some combinations be taken at the same time. Ferruginous medicines with sulphuric acid constitute a most effective means of treatment. The natives of India have from time immemorial employed a nostrum composed of garlic, aloes, and vinegar, and as a topical application the actual cautery. Shulbred's powder, consisting of jalap, rhubarb, calumba, scammony, the bitartrate of potash, and sulphate of iron, has for half a century been a favourite remedy in Bengal. Twining's formula is a compound of jalap, rhubarb, calumba, ginger, bitartrate of potash, sulphate of iron, senna, and mint water. In India the kala-nimuk, or black salt, of the bazaars is another remedy of ancient use. It consists of the muriate of soda, sulphur, muriate of lime, and the black oxide of iron. The decoction of the seed of the *carum nigrum* with acetic acid or lemon-juice is also an Indian medicine. Martin thinks highly of the saccharated carbonate of iron, the tincture of iron, and the tincture of iodine, and also the iodide of lead administered externally. This physician in addition recommends the iodide of potassium, warm baths, stimulating frictions to the splenic region, and gestation in the open air. Like most of the writers on this disease, who can speak from experience in intertropical countries, he warns against blisters, as they are apt to slough, and lays emphasis on the fact that mercurials are most injurious and destructive. At the Netley Hospital a combination of the phosphates of quinine, iron, and strychnine have been successfully used. The nitro-muriatic acid with bitter infusions is often of decided service. The diluted nitric acid, applied locally, and the nitric acid bath, have by some been regarded as very effective. The tincture of iodine diluted in the proportion of one part of the tincture and six or seven parts of water, painted over a large area of the splenic region and abdominal surface, is sometimes very beneficial. The natural chalybeate waters are often followed by a diminution of the gland. Grottanelli speaks of the practice of percussion over the splenic region as an old method of cure, formerly had recourse to in Southern Italy. In the more chronic or hypertrophous enlargement the same kind of remedial measures may be pursued. Dry friction in such examples is serviceable. The hepatic secretions should be looked to with much care in these cases. Henry, Andral, and Piorry insist on the good effects of the cold douche. In hot weather cold sponging and sea-bathing assist other means adopted. The diet should receive particular attention. If there should be any symptomatic fever, and high temperature in the earlier of the congestive stages, the food should be mainly farinaceous, and if milk agree with the patient it may be given. Soups, broths, and jellies and light puddings may be allowed, and even where there is no febrile disturbance too liberal a supply of animal food ought not to be permitted. The aerated waters are relished and to be advised as

drinks, such as soda, seltzer, potash, and lithia, and the Apollinaris waters. Dry sherry, marsala, claret, and Burgundy are perhaps the most desirable wines, which the patient can take when stimulants are indicated. Places of residence of greater altitude and drier atmosphere are often followed by marked advantage.

SPLENALGIA.

Splenalgia is a non-inflammatory and suddenly painful affection of the viscus which the older authors termed *dolor lateris* and *splenis dolor*. Voight in careful detail describes what he names splenalgia congestionis, but the affection to which he refers is evidently one of those more protracted forms which are occasionally met with of chronic splenitis. Sudden and powerful muscular exertion, by rapidly determining the blood to the internal parts, and thereby disturbing the equilibrium of the circulation, will give rise to it. The organ, as it has before been observed, being a diverticulum to counterbalance the inconvenience which would otherwise ensue from inequalities in the visceral circulation, its quick distension with the vital fluid renders the tunics tense and consequently painful. In certain hysterical and uterine affections, more especially in attenuated and anæmic females, the gland is sometimes sympathetically affected, the cause being a morbid sensibility of the nerves proper to the part, just as we know under like circumstances these anomalous pains in nervous patients incident to other organs and localities of the system. During the cold state of an ague, by a rapid afflux of blood, it will become acutely painful, and the pain immediately subside on the supervention of the hot stage. Its adhesion to the diaphragm is not unfrequent in those more especially who have resided in tropical climates and miasmatic districts, and who, during the progress of periodic fever, have had the organ distended and inflamed. This morbid attachment to the diaphragmatic surface has been considered, and not without show of reason, to be the cause of that sudden, and sometimes severe, pain experienced over the splenic region. Young people of both sexes, after violent exercise, will complain of stitch in the left side. Great runners induce this condition.

SYMPTOMS AND DIAGNOSIS.—The affection may be recognised by its sudden accession and its rapid subsidence. The absence of the ordinary febrile phenomena will point to its neuralgic character. The patient takes long sighs; he places his hand involuntarily on his left side; he tries to make a deep inspiration and cannot; his trunk is slightly curved to the left; and there is a disposition to remain in one position. The pulse and temperature are normal, and the manner of its coming on makes no suggestion as to its being inflammatory. It cannot well be mistaken for pleurisy, because pleurisy is ushered in by a different train of symptoms. That disease supervenes more slowly, more progressively; the hard, dry cough, the pulse, heat of skin, and the physical signs distinguish the one from the other. In pleurodynia, which is an affection of the intercostal muscles, or the

fibrous fasciæ lining the chest, and mostly a rheumatic affection, and though in the great majority of instances it is in the left side, it can with moderate care be discriminated from splenalgia. In pleurodynia sudden twisting and movement of the thorax aggravate the pain. Digital pressure on the intercostals increases the discomfort; it is more commonly seen in men than in women, and in those whose systems are lowered from some debilitative cause, or who live in damp houses and cold and wet situations.

TREATMENT.—Such agents as are usually employed in neuralgic affections are to be used in splenalgia. In those of nervous and excitable temperaments the restorative and tonic treatment is generally the most to be relied upon. Ferruginous and chalybeate remedies are chiefly indicated. The class of agents usually called nervine tonics, such as the various preparations of iron, zinc, valerian, and ammonia, are to be commended. The natural mineral waters which are ordered in the condition of lowered vitality and general debility are frequently beneficial. Stimulating liniments, friction, change of air, and under-flannel clothing, are to be suggested. In such cases as may come on from violent and undue exertion, rest and quiet are the obvious recommendations.

TUMOURS OF SPLEEN.

Tumours of this organ can mostly be distinguished from other tumours by their obliquity from above downwards, by their lying from left to right. They are sometimes very large. Pemberton mentions a Spleen which weighed three pounds. Morgagni saw one of eight pounds and a half. Elliott describes one of eleven pounds. Bree declares this gland may be so augmented in size as to weigh from twenty to thirty pounds. Portal knew it weigh thirty. Lieutaud found it in a woman, who had been long ill, weigh thirty-two pounds. And Twining states that in extreme cases in Bengal this viscus has been discovered so large as to fill up half the cavity of the abdomen. There are two forms of configuration which it usually assumes on its tumefaction, and these are the rounded, or globular, and the oblong. The globular results from disorganisation of the blood, and it is the accompaniment of an acute dyscrasia such as obtains in periodic, malignant, relapsing, and exanthematous fevers. Rokitsky believes this condition to be dependent upon stasis affecting the vascular system of the fundus ventriculi and the deposition of a dark pultaceous mass somewhat resembling the medullary matter found in the typhus mesenteric gland. The oblong is of firmer consistency, the edge being often notched and fissured, and the colour is not so dark, it being of a yellowish or reddish-white appearance. It gives evidence of a more sthenic type of inflammation. There is adhesion of the tunics; fibrinous matter is deposited in the parenchyma, and this deposition, by encroaching on the vascular network, gives rise to pressure, whereby the colouring particles of the blood are absorbed, and hence the lighter hue. This is its configuration in

leucocythæmia. Tumours having as their cause suppression of menstrual or hæmorrhoidal discharge, assume the last-named appearance, which is the condition of a slow and gradual degeneration. In order to detect the presence of the organ when tumid, the reader is referred to what has already been said under the head of General Symptomatology.

Cystic Hæmatoma.—Spillman describes a case in which he found this form of tumour of the organ, and he asserts he could find no record of a similar character. It was of the size of an infant's head, attached to the inside of the spleen near the hilus. The interior of the cyst was made up of a number of communicating anfractuositities filled with a yellowish fluid containing cholesterine. The nature of the growth might be judged of by the fact that the cavity was lined with a single layer of cells like those which form the epithelial lining of the vessels. In the general wall were many points of calcareous deposit. The inner surface was divided into numerous intricate spaces. In the fluid were blood corpuscles and crystals. Neither inosite nor succinic acid, both of which constantly occur in hydatids, were found in the fluid. The cholesterine, it was thought, might be the residue of absorbed blood.

GENERAL MORBID ANATOMY.

It may be remarked that in observations made on the appearance of this organ as revealed by dissection there is not unfrequently no little difficulty in arriving at a correct conclusion, because the morbid conditions so gradually merge from one into another that it must needs be but an arbitrary distinction where the attempt is made to nicely define pathological changes. In the inspections made on many other dead parts it is not so, as the cadaveric alterations are more characteristic and cognizable than they are in this viscus. The colour and configuration of the organ vary under the different morbid processes to which it is subject. It is discovered paler or darker than normal, or it may be of blackish-brown colour. In malignant and putrid fevers its colour sometimes approaches to black. It may be rendered rounder or more elongated than normal, and its fine border sometimes loses its sharper shape. And I have seen it much flattened and more spread out than natural. Andral considered that it would confer preciseness and facility in these investigations if our researches were brought to bear on two component parts; that which is contained, the blood, and those fibroid, serous, vascular, and other structures which go to make up the main substance of the gland. It may be said that the increase of size and variation of consistence are the most usual and striking changes which result from its disease. By long and continuous hyperæmia the capsular coverings become thick and dense, and the trabeculæ in corresponding manner are rendered larger and more numerous. When acute inflammation has obtained, and localized peritonitis has taken place, the serous covering is then found

thick, opaque, and unyielding. Sometimes it is white and nodulated. Bristowe, on microscopically examining a specimen of fibroid degeneration of the capsule, found transverse sections of the fibrous tissue to exhibit interlacing hyaline bundles, which in the situations where calcareous deposit was found spreading, contained in their interstices a number of highly refractive granules, most of which disappeared with the evolution of a quantity of gas on the addition of dilute hydrochloric acid.* This observer also goes on to say that on section being made parallel to the surface of the organ, the interlacing fibroid bundles could not be recognized, though planes of almost structureless tissue were still to be seen more or less covered by refractive particles similar to those which were seen in the previous sections lying in the interstices between the fibres. The under surface of the diaphanous membrane is adherent to the fibrous tunic, and externally the organ becomes attached by holding masses and bands of lymph to contiguous viscera, to the abdominal parietes, and in some instances to the concave surface of the diaphragm. The serous coat may be noticed red and vascular. Sometimes there are in the adventitious products loculi filled with serum in addition to the serous exudation which is effused into the abdominal cavity. The inflammatory process, as the almost unexceptional rule, extends deeper than the capsular investments, and if careful examination be made, it very generally occurs that a greater or less amount of thickness of inflammatory exudation can be detected in the parenchymatous substance. Indeed, in all examples of acute peritonitis it can hardly be affirmed that the inflammation is absolutely confined to the serous membrane. Under the inflammatory condition the fibrous parts may take or contain heterologous transformations, they may become in greater or less degree cartilaginous or even osseous.

SOFTENING OF SPLEEN.

Softening is a pathologic change more frequently discovered in this viscus than any other morbid appearance, and it is much more common than induration. It is sometimes impossible to say whether the softening be from mere blood stasis or inflammation. In some instances of sudden death the organ has been found large and soft when there were no reasons to suppose the existence of any foregoing disease. Softening is the common condition which follows pernicious, periodic, malignant, and relapsing fevers. The specific poisons generative of febrile diseases, by contaminating the entire current of the blood, are followed by local as well as the more obvious general phenomena, and organs and tissues through an impaired nutrition exhibit in varying degrees the more manifest conditions of absolute lesion. Under the influence of these poisons this viscus is particularly prone to the loss of vital cohesion—in other words, to a breaking up of its ultimate structure—and is certainly much more

* *Trans. Path. Soc.*, vol. xviii., pp. 257-8.

prone to such disintegrative change than any of the other solid abdominal organs. This altered state of the blood gives rise to the want of normal molecular affinity; the pulp becomes, it may be, semi-diffuent, and the capsule holds not a consistent substance, but debased, broken-up, bloody contents, and the contained grumous fluid has been likened to muddy lees of red wine, or even unto tar. The gland sometimes resembles a dark resistless clot, invested by an attenuated and tender membrane, which, on the most careful handling, breaks, the contents flowing out as a black, inorganic, putrid gore. In the more malignant forms of remittent fever such appearances have been recorded. The first morbid transformation is deepening of colour; it assumes a dark brown, or it may be black. The pulp degenerates into deliquescence, and the trabeculæ are reduced to shreddy fibres. A stream of water poured upon the loose substances readily washes away the pulp, and the trabeculæ remain, giving the appearance of stringy fibres. The various accounts given of the Walcheren fever record marked illustrations of this condition; and it was often seen to weigh four or five pounds, and looked like a membranous bag filled with tar. All authors who have carefully described the morbid appearances in typhus, enteric, and relapsing fevers have mentioned alteration of colour and softening as the common characteristics of this organ. In typhus, in well-marked instances of splenic lesion, the parenchyma is rendered so soft and resistless that it readily breaks under the fingers, and it may be converted into a diffuent grumous fluid. It was soft in fifteen out of twenty-two cases examined by Peacock, and in thirteen out of thirty-one examined by Jenner. Murchison says that in this disease it is not unfrequently reduced to a reddish-brown pulp, which runs out when the capsule is divided. In enteric fever Louis found it soft in thirty-four out of forty-six cases; Jenner in four out of fourteen, and Murchison in ten out of twenty-one cases. Andral gives similar testimony. The blood in this type of fever is seen to contain an excess of white cells, sometimes amounting to three or four times more than are found in healthy blood. From extensive personal experience in relapsing fever, I can assert that there is no organ so frequently discovered to have undergone alteration in structure and consistence as this gland, and softening is also uniformly observed. In this type of fever it is rendered larger and softer than in typhus and in the enteric form. In a number of inspections which I many years ago made on the bodies of those who had died of relapsing fever I never saw the viscus healthy. It was sometimes remarkably large and soft, the capsule was not prone to become inflamed, inflammatory products were not found on its surface, but by pressure it was more readily ruptured, the parenchyma easily broke on pressure, the contents were sometimes diffuent, and the dark reddish, semi-fluid bloody matter had a jam-like appearance. In the exanthems, more especially in the malignant types of scarlet fever, and sometimes in measles, this gland is discovered soft and

friable. Hæmorrhagic infarctions which terminate in puruloid depositions are accompanied by loss of interstitial cohesion and general consistence. In pyæmia, when those central and pyramidal patches of congestion which go on to the suppurative condition take place, partial or more general softness is the common accompaniment. In anæmia and hydræmia, and what is termed the dropsical crisis, the organ may be rendered softer as well as paler than natural.

INDURATION OF SPLEEN.

Induration of the gland is seen in very various degrees. It may be hard and condensed, or merely be somewhat increased in firmness. This change will depend upon an increase of vital cohesion in the normal structures, more especially in its fibrous and vascular elements. Continuous hyperæmia is succeeded by hyperplasia, more organizable properties may be formed in the cells, and in low forms of its inflammation lymphic deposits may eventuate in the loculi or amongst the filamentous tissues. In this abnormality of firmness the changes are in nearly all instances accompanied by enlargement and varied configurations. There is, too, much difference in the colour externally, and when sections are made of its parenchyma. Sometimes, as Bright remarks, the substance on being cut looks like damson cheese; and in other instances, as in leucocythæmia, it is of a pale dirty yellow. Diemerbroeck describes a black induration. On the whole it may be asserted that lymphic deposit is the chief cause and characteristic of its more resistive condition. Sometimes it cuts with considerable hardness, and sometimes I have seen it so friable as to break like old cheese. In those exceptional examples in which the cartilaginous generation is manifest the entire fibrous structures of the organ are augmented in bulk and increased in density. The envelopes then assume this transformation. That condition when the organ is enormously enlarged, and which Bright called *fleshy hardness*, was evidently that hypertrophous condition now regarded as the invariable and distinguishing pathologic change in leucocythæmia. The older physicians erroneously looked upon induration as identical with scirrhus; and Sauvages records a so-called scirrhus spleen which weighed thirty pounds, but which had doubtless been the usual state of leucocythæmic enlargement.

ATROPHY OF SPLEEN.

Atrophy in marked degree is rarely witnessed, and it may be said that any diminution of its volume is much less common than its increase of size. Haller, Morgagni, and other of the older writers speak of this change, but in a manner so loose and inexact that little reliance can be placed on their statements. In some chronic diseases, where there has been renal wasting, or great periodic discharges of blood, it has been found small and shrivelled. Bree says it has been discovered so diminished as to be of the smallest size, the capsule only containing a little of its vascular substance; Thomson declares

it may be reduced to the size of a walnut, or even less; and Andral records that he saw it not larger than a walnut. Dr. Church showed a small spleen at the Pathological Society, taken from the body of a woman who died of pleurisy and ascites, which only weighed five drachms and fifteen grains. It may be discovered in a mere rudimentary state; and it has been asserted that the viscus is sometimes wanting.

HÆMORRHAGE INTO AND RUPTURE OF SPLEEN.

Hæmorrhage sometimes occurs. Blood may be extravasated into the parenchyma without solution of the tunics, which occurrence has been by some morbid anatomists named "apoplexy of the spleen," from the like extravasations which are discovered in the brain and in the lungs. And more accurate observers have noticed that occasionally the remains of apoplectic effusions are detected in the presence of circumscribed reddish-brown spots, which are permeated and surrounded by lymphic deposits. These have been regarded as the abiding evidence of antecedent vascular solutions. In very exceptional instances the coats may give way, and blood be effused into the abdominal cavity, when fatal peritonitis would, if the quantity were at all large, eventually follow. The toughness and strength of the fibrous covering provide against this event, and render the accident of its rupture exceedingly rare. In those cases which have been recorded of this catastrophe, there has generally been a foregoing or primary, and mostly a febrile, affection of pernicious or malignant type, which has contaminated the entire circulatory fluids, and in secondary manner injuriously acted upon the muscular and fibrous tissues. Acting as a diverticulum, as it does to the visceral circulation, and thus necessarily being liable to be surcharged with blood, nature has provided this organ with coverings which are stronger and more elastic than the coverings of the other solid viscera; and, I believe, unless the tunics have by foregoing lesion lost their normal resilience, and thus been rendered liable to solution of continuity, that their giving way never occurs, or that such event is infinitely rare. Sometimes the coats of the vessels spontaneously enlarge, and thus under pressure may give way. Traube and Cohnheim related an instance of sudden death from rupture of a series of dilated veins of the Spleen. These veins were so elongated and distended that they were six inches in length, five in breadth, and two in thickness. Rupture is most liable to supervene in the hyperemia of pernicious fevers. In tropical countries when the viscus from endemic causes is liable to great distension, comparatively slight blows, falls, or compression are sufficient to produce its laceration. The giving way of its coats does not in any case necessarily imply a fatal termination, as instances have been recorded where a cicatrix has shown the former solution of its tunics, and when the patient has lived for a long time afterwards. Such examples have, however, resulted from accident, or were of traumatic origin.

and when the splenic pulp did not become extruded from the bursting of the diseased and tender envelopes. Rupture has been known to take place during the hot stage of an ague, and in typhus and in cholera. Babington once examined the body of a patient in whom this viscus had been completely detached, and was found loose in the pelvis; and in that instance most violent sickness had preceded death, and the powerful efforts in vomiting were considered as being the cause. Two peculiar cases of spontaneous rupture are recorded by Rokitansky, and these were in the instances of two workmen, aged respectively forty-eight and nineteen years. Both had leucocythæmic tumefaction of the organ; in both examples several pounds of clotted and fluid blood were found in the abdominal cavity, and in both the gland was five or six times larger than normal. Sir James Simpson records three fatal cases of this kind of rupture, which occurred respectively during the pregnant, parturient, and puerperal states. In one case the viscus became large during pregnancy, and the enlargement always disappeared after delivery. A woman showed symptoms of fatal sinking shortly after labour at the sixth or seventh month, and autopsy showed a laceration of an enlarged spleen, with effusion of blood into the peritoneal sac. In another patient the woman, after making some unusual exertion a week or two after delivery, complained of abdominal pain and a feeling of sinking, and then soon afterwards died, when splenic rupture and effusion of blood were revealed on inspection. The late Dr. Cumming delivered a woman by the forceps, who died in the course of a couple of hours afterwards, and examination showed a similar circumstance to have taken place. According to the accounts of the Russian epidemic of relapsing fever in 1864-5, as given by Fittermann and Küttner, in three instances out of seventy inspections the organ had spontaneously ruptured. Mr. Atkinson of Leeds some time ago published an apt example similar to the above. A lady, thirty-five years of age, was suddenly attacked with sickness and violent vomiting, which soon became accompanied by pain in the left side; these symptoms were succeeded by lividity, cold extremities, and all the phenomena of fatal collapse, and death took place at the end of twenty hours. On inspection it was discovered that there was a large collection of blood in the abdomen, which had evidently proceeded from a rent in the gastro-splenic omentum, and the Spleen was found shrunken, pale, and flabby. Dr. Deville of Harrogate kindly sent the writer particulars relative to an instance of spontaneous splenic rupture which occurred in his practice. The patient was a man of thirty-six years of age, and of temperate habits. He had been labouring under an attack of continued fever, and was progressing towards recovery, and was so far convalescent that he was enabled to dress and sit in his chair. An acute pain suddenly came on in the left hypochondrium, and after this he rapidly passed into a state of collapse and died. Inspection revealed a fissure parallel with and anterior to the hilum lienis, and some of the splenic pulp had been

extruded into the peritoneal cavity. The Spleen was exceedingly friable, and broke on removal. Blows, falls, and compression have caused its laceration. Fayrer records the accident of rupture in a Hindoo woman aged thirty-five, who fell from a tamarind tree and broke both her arms, and who died of tetanus sixteen days after the fall. The examination exhibited two ruptures in the posterior edge of the organ, the upper edge being very deep. Charcot delivered a woman in whom the spleen of the fetus was found ruptured, and this accident it appeared had been preceded by two falls, one which the mother had sustained a month and another a fortnight before her confinement. Mr. Richard Davy narrates the instance of a woman who had been run over, who was admitted into the Westminster Hospital, and who died two hours after admission. The portion of Spleen corresponding to the suspensory ligament was completely crushed off from the remaining five-sixths of the organ, and there were three linear rents in the capsule. It has been remarked that the horse under powerful muscular efforts is liable to rupture the Spleen.

GANGRENE OF SPLEEN.

Gangrene of this organ is exceedingly rare, and the accounts of its occurrence are so scanty that nothing reliable can be said of its symptoms. Murchison, however, says that in gangrene of this viscus after typhoid fever there is very rapid sinking. Baillie mentions having found it in a gangrenous condition. The older authors speak of gangrene of the Spleen, but their inaccurate and often erroneous descriptions of morbid changes throw much doubt upon such assertions, as upon many other of their statements. They were not conversant with many morbid appearances as modern pathologists are conversant with them. Recent observers of the most ample experience have not witnessed more than one or two illustrations of this most uncommon, diseased condition. Rokitsansky bears testimony to its rarity, and speaks of having only once seen it, when it affected the organ to a considerable extent. Ollivier, Portal, and Morgagni, and their contemporaries, doubtless regarded that black, grunous, broken-up state of the pulp which obtains in periodic, yellow, and malignant fevers as gangrene, which, however, differs greatly from gangrene. Hertz of Greifswald gave particulars of an instance of this morbid alteration in a young woman who had been admitted into the Greifswald Infirmary for abdominal disease consequent on the abrupt arrestment of the catamenia. The post-mortem examination gave evidence of pleuro-pneumonia with pleuritic effusion, and the diaphragm was partly gangrenous, and the Spleen almost entirely in that diseased condition.* Authenticated instances of splenic gangrene may, and truly, be regarded as among the curiosities of medical literature.

* Virchow's *Archiv.*, xl., p. 580.

HYDATIDS OF SPLEEN.

Hydatids have occasionally been discovered in this organ, but far less frequently than in the liver. They as rarely affect the Spleen as cancer, and when seen are often in association with hydatids of the liver. They may be within the substance, between the tunics, or be attached externally. They are seldom found in the pulp, and mostly in the gastro-splenic epiploon, or in the cysts constituted of the serous investment. There are no rules for their diagnosis; they sometimes, however, produce a bulging out over the splenic region, in the form of smooth hemispherical protuberances. Duroziez narrates an instance of a splenic hydatid which was voided by the bronchi. A man admitted for hemiplegia spat up a substance resembling boiled white of egg, which proved to be the *débris* of a hydatid cyst. At the autopsy the spleen was found to be hollowed out into a vast cavity which contained thick, dark-coloured fluid and dark-brownish flocculi. Wilde gives a case of hydatid of this organ in a girl of eleven years of age, in whom the tumour reached three-fingers' breadth to the right of the linea alba, and from a point in the latter, half way between the umbilicus and the pubis, to another half way between the former and the ensiform cartilage. Dr. Wickham Legg gives the case of a man who died after having epileptiform attacks and delirium, and on inspection the Spleen was found small, adherent to the diaphragm, and in the upper part was a putty-like mass, within which was crumpled up, in a manner resembling the plicative æstivation of some flowers, a transparent membrane which showed a laminated structure, and thus evidently proved its hydatid character.* Dr. Coley showed at the Pathological Society a hydatid cyst connected with this organ of the size of a cocoa-nut. When thus large they may be fatal by pressure being exercised on neighbouring organs, or by being extended into the peritoneal sac, and thus giving rise to flagrant peritonitis. Some very rare instances are recorded in medical literature, in which the cyst, by adhesive inflammation, had become agglutinated to the abdominal walls, and the contents escaped externally and harmlessly. Andral speaks of *other cysts*, which he describes as small vesicles filled with serous fluid, floating in or attached to the splenic veins; and of a cyst with fibro-serous tunic filled with hairs. Wilks relates the case of a Spleen being found in the body of an old woman, whose kidneys had presented cysts. The organ was of the average size, but at its lower end was a cyst the size of a walnut, and on its surface were smaller ones, all of which contained serum and were lined with a smooth membrane. This physician is of opinion that there was in this instance evidence of distinct cystic disease, and he comments upon the rarity of the affection as occurring in this gland, there being only one other specimen of a similar kind in the museum at Guy's. The remains of hydatid

* *Saint Bartholomew's Hospital Reports*, vol. viii., p. 181.

cysts are sometimes associated with surrounding fibroid thickening and cartilaginous hardening, or there may be calcareous infiltration. Bastian discovered a shrivelled hydatid cyst, the walls of which were about a line in diameter, and the microscopic examination of this wall was found to consist of innumerable hyaline concentric layers, some of these being forty times as thick as others; on the surface of the inner layer were traces of granular germinal membrane, and in the centre were fat and proteine granules, with amorphous carbonate and phosphate of lime. Manchartus once beheld a cyst in this gland which contained four pints of fluid. Spillman has recorded a remarkable case of cystic hæmatina of this organ.* It was of the size of an infant's head, attached to the inside near the hilus. The interior of the cyst was made up of a number of communicating anfractuositities filled with a yellowish fluid containing cholesterine. The character of the growth was deducible from the following facts, namely, the cavity was lined with a single layer of cells like those which form the epithelial lining of the vessels; in the general wall many points of calcareous deposit existed; the inner surface was divided into numerous and intricate spaces; the fluid contained numerous blood corpuscles and crystals; and neither inosite nor succinic acids, both of which constantly occur in hydatids, was found in the fluid.

DEGENERATIONS OF SPLEEN.

The degenerations which occur in this viscus, like the transformations which occur in other organs and tissues, are in their ultimate textural changes and in their progress latent and obscure; they depend upon molecular abnormality or some perversion in the assimilative functions, and some vice in the vital endowment of the part which is doubtless referrible to a more general cause, and it is most probable that the first morbid condition takes place in the blood. It may be that there is an albumenoid conversion whereby oil is generated in the circulation, to the decrease and supplantation of normal nitrogenized materials, and hence they form the fatty decay; and that some analogous fundamental error in the vital fluid disposes to fibrous, calcareous, and various other products. These changes are of slow and chronic nature, and the substitutions which they effect are necessarily followed by the more prominent and cognizable phenomena of impaired function.

Fatty degeneration of this gland is sometimes found in association with that change in the heart, liver, and kidneys. There is then seen an excess of oil molecules in the textural and vascular formations. The parenchymatous substance more readily breaks up under the fingers, and according to Rokitansky the blood contained in the vessels is frequently of pale red colour and is more serous.

In the *fibrous degeneration* of this gland there is a fibrinous crasis, and certain thickenings and depositions eventuate; according to

* *Archives de Physiologie*, Aug., 1876.

Henle, they are produced out of an effused plasma and by the nuclei developing short fibres whose union renders them more complete. Compression and atrophy of adjacent textures will be proportionate to the sum of these formative materials. The septa as well as the splenic capsule enlarge in volume, but in the latter the alteration is the most marked. The trabeculæ are rendered stronger and tougher, and thus the gland possesses greater power of resistance, and the tunics look more opaque. A man aged sixty-five was admitted into the Tunbridge Wells Hospital, and he died of a low form of pneumonia. On inspection the house-surgeon, Mr. Cleland Lammiman, discovered the Spleen to exhibit the notable appearance of fibroid transformation. The gland had assumed the renal configuration, and the fibrous covering throughout was of dense, white structure, the eighth of an inch thick, and in the parenchymatous substance were found two hard, unyielding fibroid deposits. Gytot relates the case of a man who in early life had had intermittent fever, and after whose death dissection discovered this organ to be covered with a gelatino-fibrous network, and the microscope showed an abundance of fusiform and stellated cells, and other elements which enter into the cartilaginous structure. This kind of degeneration is more common to this gland in those who have had acute splenic inflammation, and in the aged it is sometimes met with as one of those heterologous changes incident to middle and advanced life.

The next pathologic product of which I shall speak, and one which is sometimes observed in this organ, though not so commonly as in the liver, kidneys, and lymphatic glands, is that known as the *lardaceous* or *amyloid* substance. Perhaps in the strictness of technical language it can hardly be called degenerative in the same sense as we employ that term in description of the fatty change, when there is absolute substitution of the sarcolin within the sarcolemma; but this adventitious substance by its presence destroys healthy tissue and supplants it, and therefore the results are so analogous that I now refer to it under the present head. It is of albuminoid nature, and according to Wilks its appearance implies a long-standing and deep-seated cachexia, and a foregoing caries or necrosis of bone which has originated in tuberculosis or syphilis. According to the last-named authority, the substance when incised is semi-transparent, and presents the appearance of wax and lard combined, yet it is not fat, nor wax, nor gelatine, but, as Virchow describes it, the product is a peculiar albuminous compound. According to Frerichs and Murchison it is rarely associated with fatty degeneration in phthisical subjects. Dickinson, founding his opinions on the experiments of Hasse and Lehmann, as well as from clinical observation, attributes the cause of this deposit to a loss of albumen and alkali from the blood; and is consequently of opinion that suppuration and albuminuria, and not phthisis or syphilis, are the main causes, and says it is followed by an excess of fibrin in the

blood. There are no symptoms during life whereby this substance can be positively diagnosed; but in certain instances of protracted and suppurative caries, when the liver is large, and at the same time the lines of splenic dulness are exceeded, it may be suspected to exist. When after death it is found in this gland, the deposit has in nearly all cases been discovered also in the liver and kidneys. According to Gairdner the lardaceous or amyloid condition is characterised by an increase of firmness being given to the organ; it is waxy looking and the Malpighian sacculi are transparent and distinct. Aikin, in describing this lesion, says the gland is enlarged, and has a swollen aspect, that it feels of the consistence of wax and lard, and that the Malpighian corpuscles are rendered more distinguishable, being round, colourless, prominent, transparent granules, and that the pulp is greatly diminished in quantity and seems in some to be entirely absent; and this writer also asserts that, under the higher microscopic powers, the ultimate change consists of an alteration in the normal corpuscles of these sacculi, which are converted into masses of colourless, dense, homogeneous, translucent material which exhibits irregular cell forms. Busk and Huxley are of opinion that this pathologic change first commences in the arterial capillaries, that the sacculi which at the first contain normal splenic cells, at the later stage contain granular and lymph corpuscles, which ultimately pass into a waxy substance, and that at length the trabeculae and pulp undergo a similar morbid conversion. Wilks describes three conditions incident to this viscus which are connected with the lardaceous disease, but says that only one of these ought strictly to bear that name. In the true affection he says that round translucent bodies occupy the place of the Malpighian corpuscles, looking like millet seeds, but never encroaching upon more than half of the splenic pulp; that the adventitious product confers some amount of enlargement and density, and that it is not only deposited in these corpuscles, but surrounds the smaller arteries and the trabeculae. In the second form, according to this pathologist, the same kind of translucent substance looks as if melted tallow had been poured into the cellular structure in an ill-defined and incidental manner, and he believes it to be of strumous origin. The third description given by this physician is of a whitish-yellow soft material deposited in the gland in irregular masses, and which is connected with enlargement of the lymphatic glands. Some have named this pathological state of the organ *sago spleen*. The application of weak tincture of iodine when brushed over sections containing these bodies produces a brown colour, which is characteristic of the amyloid substance. An apt illustration of lardaceous spleen is given by Dr. Hilton Fagg* in the instance of a man who died of Bright's disease. He had voided about four pints of urine daily, which was of light specific gravity and which contained a large quantity of albumen. Inspection revealed proofs of syphilis; there

* *Path. Soc. Trans.*, vol. xxii., p. 278.

were small soft nodes beneath the pericardium, and the liver contained whitish-yellow tough gummata with soft mucoid centres. Several of the viscera were lardaceous, the liver yielded a slight and partial reaction with iodine, and the right supra renal capsule was affected with this change in marked degree. The spleen weighed ten and a half ounces, was highly lardaceous, and presented the appearance of sago-spleen. It also showed whitish-yellow patches of irregular form, and all reaching the surface; on section they were more or less wedge-shaped, like infarctions, and gave a reaction with iodine. On section their cut surface was of dull yellow, with some greyish, translucent parts. They were portions of the lardaceous change in a state of fatty degeneration. Wilks and Moxon say this morbid change is not confined to the small blood-vessels, but extends to the lymphoid structure, which composes the parenchyma of the corpuscle. The lardaceous and amyloid matters are always found together in the specimen examined.

Hodgkin was the first to point out the fact of enlargement of the absorbent glands in connection with a peculiar white suet-like deposit in the splenic pulp, and which, although it bears a resemblance to lardaceous disease, cancer and tubercle, is certainly identical with none of those products, which by its destruction of the surrounding healthy tissues may with some propriety be considered malignant, and this organ is its most usual seat, though it is occasionally found in the liver and other of the solid viscera. In the affection more particularly referred to the lymphatic glands become very large, with great uniformity of structure, and their enlargement precedes, it may be for a long time, the splenic affection, nor is there in them a tendency to suppurate. These white bodies located in this viscus are distinct and well-defined, and the more obvious conditions are splenic enlargement, with anæmia and anasarca. The splenic corpuscles which possess this deposit are, as before noticed, in the blood-making functions closely related with the absorbents, and this disease originating in the lymphatics, it can be well understood would, in organs possessing kindred functions, be exemplified in the Spleen. *Payne* published a good illustration of this affection in the case of a boy ten years of age, who during life had presented himself with enlarged Spleen, the organ reaching from the seventh rib to the crest of the ilium vertically, behind into the lumbar regions, and in front almost to the mesial line. On dissection this viscus was discovered to contain numerous tumours of the kind called lymphadenoma and infarctions, and the lymphatic glands were similarly affected throughout the body, some containing caseous matter which caused them to be regarded as of a scrofulous nature.* A youth of eighteen was admitted into St. Mary's Hospital, under the care of Dr. Sibson, and died some weeks after admission. The lymphatic glands generally were much enlarged. The Spleen was hard and large. On its surface were several pro-

* *Path. Soc. Trans.*, vol. xxii., p. 278.

jecting masses, and on section the organ was mottled with white masses. This diseased product on being microscopically examined was composed chiefly of round cells, of spindle-shaped cells, or what appeared to be free nuclei.* It has been shown that in these tumours polymorphous cells, fibro-nucleated tissue, and an amorphous albuminoid material may coexist in the same case. Dr. Hilton Fagg showed an enlarged spleen and lymphatic glands at the Pathological Society. A large, heavy woman had been quite well until two years previously. She then began to lose flesh, and abscess formed in the left groin. Inspection showed the glands throughout the whole body to be enlarged, with tendency to the suppurative condition. Disease had commenced in the uterine appendages. The spleen weighed twenty ounces, and in it were a number of large masses the size of a walnut containing a cheesy-looking substance. There being some evidence of syphilis it is presumptive that the cause of these morbid changes was referrible to specific origin. Wilks, in speaking of this diseased condition, says its peculiarity is in the glandular system being first affected, and the Spleen afterwards becoming involved; and he remarks that it is possible for the propagation to take place in the course of the lymphatics, and the reason why the splenic corpuscles are affected is their intimate connection with the absorbent system. He also states that the adventitious substance when examined by a microscope shows, when taken from the lymphatic glands, an abundance of cells scarcely distinguishable from the normal secreting bodies with more or less fibrous tissues. This adventitious substance, which pathologists have variously named as lymphoid or adenoid or as lymphadenoma, bears the most resemblance to tubercle, and has doubtless been mistaken for that deposit. These anomalous substances are mostly found in the vicinity of blood-vessels, and are not unfrequently surrounded by a rusty-looking product, which appears like blood which has undergone some morbid change. Sometimes these little spots are very hard, and without any appearance of central disintegration or softening. In the liver the material is much tougher and fibro-nucleated, whilst in the lungs, Spleen, and kidneys it is composed mostly of cells which resemble somewhat those of tubercle.†

SYPHILITIC SPLEEN.

Syphilis affects the Spleen as it affects the other solid abdominal viscera; and since the extent and nature of the ravages of that complaint are better known to the pathological anatomist than was formerly the case, it is now admitted that no organ or tissue possesses an immunity from this specific affection. The liver is more frequently the seat of this disease than this viscus, and when

* *Path. Soc. Trans.*, vol. xix., p. 401.

† *Guy's Hospital Reports*. Third Series. Vol. xi., p. 64.

the Spleen does give evidence of the lesion, the liver as the rule presents a similar pathologic appearance. In some examples there may be partial or more general splenitis, in which a low form of inflammation is exemplified, implicating a greater or less area of the fibrous capsule and serous covering, as evinced by opacity, thickening, vascularity, effused products and adhesion to contiguous parts. A debased lymphic exudation, or, as it has been called, an albumino-fibroid material, is formed in the parenchyma of the gland, sometimes towards the centre, in other instances near the surface; and the microscope reveals granular elements in the course of retrograde evolution. When syphilitically affected, the organ is very commonly enlarged; hyperæmia, a consequence of the morbid change, tends to tumefaction, and infarction institutes the inflammatory phenomena with effusion and increase of volume. Those gummata which are met with on section are roundish or circumscribed patches, and may be singular or in great or less numbers; according to Lancereaux, they are seen as whitish or yellow-looking nodosities, being frequently deep seated, and quite characteristic of their specific origin. They greatly resemble the localised infiltrations from this cause in syphilitic liver. Sometimes the cut surface looks red and shining, and the gland at the same time has acquired density, as ascertained on pressure being made by the fingers. Induration is the most usual alteration; but in some instances the viscus is rendered soft and pasty to the feel. One of the best descriptions of the syphilitic state of this gland is that given by Virchow. "Under the influence of a moderate hyperæmia," says he, "some parts of the splenic parenchyma become tumefied; sometimes deposits are formed in one or other of the lobes, sometimes the change extends irregularly throughout the whole organ. The affected parts are hard when cut; they appear darker, drier, and more consistent. Sometimes they are of a blackish-red colour, and resemble hæmorrhagic deposits, and it is even difficult to distinguish them from inflammatory congestions. Later on the redness disappears, especially at the centre; the tissue of the organ, while becoming drier and harder, takes on a paler colour; sometimes, on the contrary, it is of a greyish red. From this moment the augmentation of the conjunctive tissue is evident. At the points where the change takes the form of a deposit there is afterwards seen a retraction, or thickening, and a cicatricial depression, as we have seen in the syphilitic lesions of the liver, the testicle, and the iris. White and thickened in such cases, the fibrous capsule of this gland generally adheres to the diaphragm." In addition to palpable enlargement, the most marked event is perisplenitis, the symptoms of which, however, are generally marked or ill-defined and localized. Dr. Gee says that enlargement of the Spleen in children the subjects of congenital syphilis is about in the relative proportion of one-half of all affected, and that in one-fourth it is very large, and can be felt below the costal cartilages. This disease of the organ in children

is often passed over, and even not suspected. There is frequently an accompanying enlargement of the liver and lymphatics, and death as the rule is the result. The liver diminishes, and returns towards the state of health far more rapidly than the spleen. Enlargement with hardness are the chief morbid changes. The size of this organ is some index to the degree of cachexy, and that its increased volume continues two or three years after the more manifest indications of the specific disease have disappeared. In several examples which have latterly been published, in which splenic lesion was traceable to the syphilitic taint, the morbid appearances, as before remarked, very closely resembled that infiltrated and denser condition which has been more frequently given of syphilitic liver. And, as Diday remarks, the more attention which is now being bestowed upon visceral lesions in syphilitic children, will supply a better explanation of deaths which hitherto have been vaguely attributed to debility and the more general effects of the poison.

TUBERCLE OF SPLEEN.

Tubercles are sometimes located in this gland, but almost if not always in connection with tuberculous deposits in other organs, and generally in children. In acute tuberculosis Rokitsansky says the viscus is swollen and softened, and more like the condition it assumes in the typhoid state. Jenner asserts that it is often the seat of tubercle in children, but only in exceptional cases in the adult. The lungs and mesenteric glands are very commonly at the same time diseased, and the tuberculous matter in the splenic parenchyma is seen in minute and scattered grains, or in isolated groups, and may vary from the size of a millet-seed to that of a pea. A patient was admitted into St. Thomas's Hospital, under the care of Dr. Peacock, who died from general tuberculosis, the meninges, lungs, kidneys, and other parts presenting miliary granulations. The spleen weighed fifteen ounces, and was completely stuffed with caseous nodules the size of large peas, some of which were softening, and their yellowish colour contrasted strikingly with the dark-coloured pulp. The tubercles are often distributed throughout the substance with much regularity, and they may be solid and hard; but in the course of time they soften in the centre and assume a curdled appearance, or look like cheesy substance. Bilbroth says that in miliary tuberculosis of this gland the parenchyma is rendered dark, hyperæmic, and extremely brittle, that the deposit is in the splenic tissue, and that the veins in the vicinity of the tuberculous matter contain a large number of cells with large nuclei very similar to those found in typhus spleen.

CANCER OF SPLEEN.

Splenic *cancer* is exceedingly rare, and is seldom if ever discovered alone. Jenner bears testimony to its rarity, and thinks he has never seen it except in conjunction with the same growth in other

organs. A specimen was exhibited at the Pathological Society of what was supposed to be primary splenic cancer, and which occurred in the practice of Dr. O'Connor. A most careful search had failed to discover malignant growth in any other part of the body. The Committee on Morbid Growths, who microscopically examined the product, pronounced it to be carcinomatous, but, as they observed, there had been effusion into the left pleura, with no obvious conditions preceding that event, and there might have been a small and primary mediastinal tumour, thus lessening the probability of this case being, as it had been supposed, an almost unique example of primary splenic cancer. In some cases the Spleen and lymphatic glands have both been cancerous, and some have attributed such coincidences to the fact of functional alliance between those organs. It may be found of the scirrhus variety, but it is far more likely to be met with in the encephaloid form, such as we discover in the liver. The authority now quoted illustrates carcinoma of this viscus in the instance of a patient under his care in the hospital. A woman was admitted for scirrhus of the breast and rectum, and she presented all the conditions of the cancerous cachexia. A large tumour occupied the left hypochondrium and passed up under the ribs, and it was hard, with a sharp edge, which met the margin of the thorax at a right angle. Its dulness extended up to the level of the nipple, and the lower edge was on a level with the umbilicus. It was situated just beneath the parietes, moved up and down with the movements of respiration, and could be pushed a little from side to side by the hands behind and in front of it. Its surface was irregular, and in the anterior border several distinct nodules could be felt; and the increase of dulness, the hardness and irregular surface, and the nodules were precisely the same in kind as are those which are common in carcinoma of the liver. Sometimes the deposit may be central, and neither the configuration nor the bulk of the organ be materially altered; and it is then seen in rounded deposits. The malignant growth becomes invested with a fibrous sheath, and in some cases the product becomes disintegrated within this covering. Mr. Maurice exhibited at the Pathological Society a case of colloid cancer of the Spleen in a man aged thirty-six, and it was remarkable for the very large size which the organ acquired by the presence of malignant deposit. At the same Society Mr. Durham some time ago showed a specimen of splenic cancer in which the organ weighed twenty-four ounces. Its surface presented small whitish, granular growths in the capsule, and the same bodies extended into the parenchyma, varying in size from great minuteness to the size of a vetch-seed, and the section resembled Virchow's illustration of lympho-sarcoma of this gland. When detected in this organ it has not unfrequently occurred, on minute investigation, that the lumbar glands here show evidence of the cancerous product. *Melanosis* may occur in the splenic substance, as it may occur in nearly all other organs of the body. Though it cannot strictly be

considered a morbid product in itself, yet this black matter is secreted from the blood very commonly when there is malignancy, and it is under such circumstances that it is found in this viscus.

OTHER ANOMALOUS GROWTHS.

Sometimes on free sections being made in this organ, masses of *yellow fibrinous matter* of uniform consistence are discovered, and Bright thought them to be the remnants of apoplectic clots, but which more recent pathologists would regard as the remains of extravasations produced by emboli. Moxon examined a Spleen in which there was a circumscribed patch which presented the ordinary condition resulting from embolism, and a plug of pale fibrin filled the arterial branch which went to this part of the organ. Nodules and masses of yellow opaque matter are sometimes found in this viscus associated with some foregoing and general disease in the system. Dr. Douglas Powell related the case of a young woman who died of tubercular phthisis in the Brompton Hospital, illustrative of what is now affirmed.* On the surface of this gland were many spots varying from the size of a pea to a large filbert, and on section these nodules were found to be firm, opaque, yellow globular masses imbedded in the splenic parenchyma. The vessels were not blocked, as each mass was invested in a thin fibrous capsule, or on minute examination these depositions were seen to consist of a fine fibrous stroma, the fibres of which were granular, and free fatty granules were also detected. They doubtless resembled the cheesy matter known as a product in scrofulous inflammation, and which sometimes bears a resemblance to those gummatous formations which in more external deposits are noted in subjects who have laboured under the syphilitic cachexia. Balfour and Grainger Stewart published a case of ascites with enlarged Spleen, in which the splenic vein was atheromatous, and in which there were several true aneurisms. The fibrous tunic has been discovered three or four lines in thickness, and occasionally between the serous and fibrous coverings *ossific* laminæ have been found. Bright once saw, on section of the organ, two pieces of bony matter imbedded in its substance. Valsalva discovered the coats converted into a spherical bony hardness; and Littré exhibited to the Royal Academy of Sciences in Paris a specimen of this gland, the whole substance of which had become osseous. These last-named changes are nearly always in old people. Rokitansky says they are often noticed as the ossification of fibroid laminæ, or as the cretified fibrine in the cellulo-fibrous callus. Bampffield narrated a remarkable case of ossification in which from the centre of the viscus arose a spherical bony tumour as large as the head of a fœtus seven months old, and it contained seven ounces of serum, in which were floating bright, micaceous, chalky particles. Calcareous deposits have been noticed as free concretions or phleboliths in the venous channels of the gland. Morgagni recorded an

* *Trans. Path. Soc.*, vol. xx., p. 366.

instance in which a calculus weighed twenty-one drachms; and in the "*Acta Parisiensa*," an example is given in which the internal structure of the Spleen was found bony without any other mark of disease. It has been observed in some cases, in which the organ has been larger, and more especially when chronically enlarged, that *White Patches* have been produced on its surface, and most commonly on the convexity. The upward and downward motion of the viscus during the act of respiration in such instances, causes local irritation, and thus gives rise to fibrinous thickening of the capsule. White patches of the same kind are sometimes seen on the liver, but more frequently, on account of its greater motion, on the ventricles of the heart. Their extent and amount of thickness, of course, depend upon the degree and direction of the friction to which the organ has been subjected. *Cicatrices* like the old seams of former incisions or ancient scars are occasionally discovered on the splenic surface after death, and such marks leave no doubt as to their having been produced by previous injuries.

DISLOCATION AND MALFORMATION OF SPLEEN.

Dislocation of the Spleen is another and remarkable circumstance of which a few instances can be found recorded in medical literature. Its displacement may be congenital or caused by disease. In absence of the diaphragm, and in rupture of the diaphragm, it has been found within the thoracic cavity. Haller, in the case of a child, saw it lying by the side of the urinary bladder. Desault beheld it in the right side of the thorax. Riolanus on two occasions witnessed it adherent to the uterus. Ballonius once found it attached to the bladder. Dunglison discovered it resting on the brim of the pelvis, retaining its peritoneal and vascular connections, and freely moving in all directions. Wilks and Moxon saw a Spleen, of twenty-four ounces weight, entirely dislocated and lying in the pelvis, which might have been mistaken for ovarian tumour. Küchenmeister has collected several cases in which this organ has been found displaced. Rokitsansky has given three examples. The first of which he speaks was in a young man, and the gland was found upon the right ilium attached to a twisted pedicle, and the pedicle consisted of the pancreas and splenic vessels. The second case was in a phthisical woman, in whom it had sunk down into the left iliac region, being joined to a long pedicle and to the omentum. In the third illustration the organ was adherent to the sigmoid flexure and small intestine, and it was the size of a goose's egg. A remarkable case was exhibited to the Société d'Anvers by M. Kurns. A woman, aged forty, was admitted into the hospital, apparently suffering from strangulated left inguinal hernia, and she had a tumour of about the size of the fist in the iliac region. Vigorous treatment was resorted to, but without success. On examination after death adhesions were found to have formed between the omentum and the intestines, and flakes of lymph in several positions.

The tumour was found to be the spleen held by pseudo-membranous bands to the abdominal wall, and also to the intestines, which were very much dilated beneath it. The splenic vessels formed a large cord leading to the left hypochondriac region, but the substance of the organ was normal. Elongation of the ligaments is the cause of this displacement. Twisting of the pedicle compresses the nutrient vessels, and atrophy of the viscus results. It has sometimes occurred in examinations after death that this organ has presented a shape and configuration rendering it unlike its natural appearance. It has been found thick and round, and the anterior edge hardly or not at all defined. Sometimes it is more spread out and thinner than normal; or it may be symmetrical and unnaturally small, and it may show rudimentary lines as if two or more Spleens had coalesced. Several pathologists remark upon its occasionally having been seen fissured and lobulated. Riolanus noticed this fact, and records that he had thus seen it double or threefold, and Bartholoniuss asserted that he had seen it in five portions.

SUPERNUMERARY SPLEENS.

Sometimes one or two or more separate and distinct Spleens have, on dissection, been discovered. They have been observed small as a sparrow's egg or a filbert, and, on examination, their internal structure has resembled that of the larger organ with which they have been associated. Fallopius saw three Spleens in one subject, and Chieselden, Cruveilhier, Huske, Bright, and others mention having met with a plurality of this gland. Splenules, which are far more commonly met with, are but portions of the larger Spleen.

GENERAL DIAGNOSIS.

It should be held in remembrance from what has already been said in this article, that splenic diseases in this country are by no means so commonly met with as, from the writings of the older authors, it is evident was formerly the case. The reclamation of waste lands, the better and far more extensive drainage, and an improved system of agriculture have told most favourably in the prevention of intermittents and remittents, and consequently in the diminution of splenic diseases. Still, from time to time the miasmatic affection of this gland comes before almost every practitioner of medicine, and the general rules of observance for the detection of the maladies incident to the viscus may now concisely be recapitulated. That condition of the countenance, and those peculiar and more objective symptoms exemplified in the patient, which are so commonly seen in those labouring under one or other form of this organ's lesion, and which are said to enter into the condition constituting what is termed the splenic cachexia, point significantly to the kind of ailment which obtains. The dull, listless, apathetic expression; the dirtyish yellow-hued colour of the skin; the pale and bloodless eyes; the puffed face; and the exsanguine lips, tongue,

and gums, confer striking evidence, which cannot fail of a correct interpretation. The facts elicited in clinical history generally give etiological particulars which are in close accord with the nature of the symptoms; and more accurate examination and attention to the physical signs add positiveness to diagnostic inference. In the young, and those whose constitution has not been undermined by long residence in tropical climates or aguish districts, the cachectic state may be less pronounced; still, whenever the functions of this organ are in any way interfered with, the blood-making process cannot be normally carried on, and a greater or less degree of anæmia is produced. In certain of its organic and chronic diseases, more especially when there is manifest enlargement, the diagnosis is not difficult; but in some other forms considerable doubt may be left in the mind of the physician, and even after much painstaking and patient investigation. In acute splenitis, when the tunics and convex part are inflamed, the diaphragm not unfrequently becomes implicated, when there are sharp pains, cough, and dyspnoea; the surface is then hot and dry, the thermometer indicates elevation of temperature, the pulse runs high, and peritonitis may, and mostly does, in circumscribed manner obtain; but the tenderness on pressure is not diffused, or only in exceptional cases, over the abdomen. The patient cannot lie on his right side; he then reclines on the left; or involuntarily assumes a diagonal position. On palpation there is more or less of tenderness over the splenic area, and often on movement of the trunk from the right to the left side there is acute pain. When there is enlargement of this viscus in periodic fevers, the diaphragm may be so pushed up as to compress the base of the left lung; but percussion over the dull thoracic part does not give that dead sound which, when it obtains, indicates fluid in the lower portion of the chest, and the dull space is not varied from the former cause by the altered position of the trunk. The breath-sound is absent altogether, there is no ægophony; no splash is heard on concussion; the dulness is continuous below the false ribs; and palpation generally discovers the round, smooth, or notched edge of the organ. This disease is distinguished from hepatitis by the absence of jaundice and the abnormal colour of the excretions; in liver complaints the patient lies on or inclining towards the right side, and digital examination and percussion mostly confer a correct knowledge of the enlargement of the liver. When the left line of the liver exceeds its normal boundaries, the dulness extends to the right hypochondrium, and it may be held as a rule that in nearly all cases the right lobe is also diseased. Splenic enlargement is known from pleurisy and pneumonia by the non-existence of those physical signs and more general objective or subjective symptoms which are so indicative of these respective affections. There is not the pleuritic pain at some point of the thoracic wall, the pulse is not so quick and full, nor is the temperature so high, as when that serous membrane is inflamed. The absence of the dusky hue of the countenance, the

pneumonic sputa, and the shallow, hurried respiration, which are so characteristic of inflammation of the pulmonary substance, are guiding negative facts. It is distinguishable from pleurodynia by the seat of pain and unaffected circulation, more sudden supervention and transient character of that complaint. It differs from nephritis, because in kidney lesion the pain is localised more in the lumbar region, and renal mischief can with certainty be decided upon by the ordinary tests employed in examining the urine. It may be known from encysted and movable kidney by the dulness being continuously traced up under the thorax and not towards the spine; and, too, by the less mobility of the mass than there is in these alterations now named in the kidney. It does not agree with ovarian tumour, from a general review of the more prominent circumstances associated with ovarian disease. In ovarian tumour there is resonance, in the earlier stages especially, between the upper edge of the tumour and the false ribs, and the enlargement is lower in the abdomen and traceable into the pelvis. It varies from impacted colon, because in the last-named affection the percussion dulness can be followed transversely and in coincidence with the colonic course; there is then often a configuration which to the touch varies from day to day, and a large injection will mostly settle the question. In aneurism of the aorta the pulsation and bruit, and not unfrequently the greater or less degree of paralysis in the legs, tell with much distinctness of that grave disease. In cancerous growth of the omentum, the tumour is flat and hard, and widely spread over the abdominal cavity, and generally there is great and lancinating pain. In carcinomatous enlargement of the cardiac end of the stomach there is generally much sickness, with sharp stabbing pains and sour eructations. In splenic disease there is, as the rule, a history of marsh fever, which denotes the true nature of the malady.

The indications of suppuration are flushes and rigors, throbbing, enlargement, wasting, and declension of strength, a dull aching rather than acute pain in the left side, and without the symptoms of empyema, phthisis, liver disease, suppurative nephritis, lumbar abscess, or ulceration of the bowels. In mere congestion the pulse is usually slow and large, nor is there any marked degree of pyrexia. In leucocythæmic hypertrophy there may be no history of malaria, and the organ extends downwards and forwards rather than transversely; sometimes this kind of splenic tumour half fills the abdominal cavity; and in no other lesion of the organ does it assume such enormous dimensions. Blood taken from a patient under such circumstances and examined by the microscope shows the inordinate number of white cells, which render it different from mere anæmic blood, and which so markedly characterise that affection. In anæmia there is deficiency of red corpuscles, and in chlorotic females the heart is feeble and the liver generally engorged. In the disease now known as anæmia lymphatica, the blood-globules are pinkish, in diminished quantity, and the lymphatic glands are large. The chief

and more obvious diagnostic appearances of splenic disease in children are the marked indifference which they exemplify to things around them, the neglect of and little inclination for childish amusements, the blanched conjunctivæ, the sickly, pale, waxen complexion, and the loss of flesh and strength. The increased splenic dull area is often distinct, the abdomen is full and round, and the bowels are irregular. On the examination of the blood there is deficiency of fibrin and red corpuscles. Some writers have said the face of the child often presents a creole shade, which is not the ochrey colour of icterus, nor yet the discoloration of chlorosis, but a shade quite special, which, in no very felicitous phraseology, has been called bluish icterus. For more precise details relative to diagnostic differences, and those special symptoms whereby the various lesions of this viscus can be recognised, the reader may recur to what has already been said under the head of Symptomatology.

GENERAL PROGNOSIS.

In forming a prognosis relative to the diseases to which this organ is liable many and varied circumstances should be taken into account, and the diagnostic conclusions will very greatly determine the opinion to be formed as to future eventualities in the course of its respective maladies and the ultimate result. The clinical history and various antecedent occurrences must in all instances necessarily modify the decision at which the physician arrives, and without a knowledge of such foregoing facts no right conception of the issue can be entertained. The probabilities of recovery will depend much upon the kind of complication, the vital powers of the patient, the longer or shorter duration of the affection, and the causes by which it has been produced. When coexistent with other diseases, the nature and degree of severity of such diseases should be duly regarded, and the influence which they are likely to have upon the lesion of this viscus. In sthenic types of splenitis or those of unbroken constitution, and when it is the accompaniment of periodic fever, the prognosis is favourable. In pernicious remittents and in adynamic fevers, when there is great contamination of the blood, when the organ has become gradually large, and seems little amenable to treatment, and when there is hepatic, cardiac, or renal complication, with ascites or anasarca, the prognosis is unfavourable. Marked and chronic enlargement, and when the gland is soft and resistless to the touch, and when it comes down below the costal edge, and it is preternaturally hard, such changes cannot otherwise be contemplated than as being of grave import. Such instances as are accompanied by hæmorrhagic discharges, more especially by epistaxis and hæmatemesis, generally indicate a serious lesion of the organ; or when there is a persistent diarrhœa with occasional melæna in patients much emaciated, and particularly those when these symptoms are in association with general dropsy, there are well-grounded reasons for fear as to the ultimate issue of such cases.

Again cutaneous maculæ, vibices, and dark purpural stainings are very unwelcome appearances. When there are decisive evidences of splenic suppuration, such condition is most ominous, as death generally follows. In simple congestion produced by marsh fever, the primary cause being removed, and a proper course of treatment pursued, recovery as the rule succeeds, or if the enlargement is evidently traceable to hepatic obstruction brought on by some functional or temporary occurrence, the gland may fully regain its normal size and natural functions. In leucocythemic hypertrophy the cases mostly go on to a mortal termination, and the prognosis is then most unfavourable. In cases which are believed to be those of cysts, hydatids, and other anomalous growths encroaching upon the parenchymatous substance, the opinion cannot be otherwise than dubious and full of apprehension. In children and young people in whom has been induced splenic disease from malarial poison, change of district or climate gives great hope of restoration to health.

CONCLUSION.

In conclusion, it may be remarked that miasmatic enlargement and other morbid states of this viscus, as it has already been stated, are amenable to remedial measures, but certain conditions of its chronic hypertrophy cannot be influenced by medicine. Under a due consciousness of this fact the extirpation of the gland has been practised. It is recorded by Gustav Simon* that in the case of a young Neopolitan it was removed by Zaccarelli in 1549. A medical friend of my own, who had long resided in India, told me that the operation had occasionally from remote times been had recourse to in that country, but the want of success had led to its discontinuance. It was done by Quittenbaum of Rostock, in 1826; by Kückler of Darmstadt, in 1855; and in November 1865 it was performed by Sir Spencer Wells. The arguments which have been advanced in favour of the reintroduction of this terrible measure are that its removal from the lower animals has apparently been followed by no ill effects in the system; and that it has been removed in the human subject by accident, as narrated by Morgagni, when the individual subsequently lived five years; and, finally, that it may be atrophied to an exceedingly small size without life being sacrificed or the health materially injured. Such considerations are likely to weigh much in these days when the abdominal cavity can, as it is so constantly shown, be freely opened with the greatest success. The patient operated on by Wells was a married woman, who had had children and was thirty-four years of age, and who was considered to be dying of splenic disease, such being her only ailment. In October 1865 the viscus extended as high as the seventh rib, and it reached down so low into the pelvis that it could be felt through the walls of the vagina; and the line of union between it and the left lobe of the liver could not by palpation or percussion be determined,

* Gustav Simon, "Die Extirpation der Milz am Menschen." Giessen, 1857.

nor were there as accompaniments either dropsical tendency or glandular enlargement. The gland rapidly increasing and the patient losing ground, Sir William Jenner was called in consultation, when he detected a soft anæmic murmur over the cardiac region; and on microscopical examination excess of white blood-globules was discovered. Death being inevitable if the case were left alone, the operation was decided upon, and it was terminated in thirty-five minutes under chloroform. She recovered from the shock, but died of pyæmia on the seventh day. The cadaveric inspection revealed effusion into the pericardium and both pleural cavities, but no peritonitis beyond the vicinity of the wound, and no hæmorrhage. The organ weighed six pounds four ounces, avoirdupois, and it measured eleven inches in length, eight in breadth, and between three and four in thickness. Kæbeilè lately excised the spleen in Spain, but the patient died from hæmorrhage. Its ablation not long ago was successfully effected by Péan. Mr. Bryant excised it in June 1866, the patient being a young man of only twenty years of age, who for a year and a half had laboured under its leucocythæmic enlargement. The tumour filled nearly the whole of the left side of the abdomen. The operation was easily performed and the tumour readily withdrawn from the cavity, but the patient survived only three hours, the cause of death being hæmorrhage into the abdomen, not, as it seemed, from the pedicle, but from a smaller vessel lacerated during the process of separation of the adhesion. The last-named surgeon a second time removed it in a leucocythæmic woman, aged forty, and in this as in the preceding instance hæmorrhage caused the fatal result, the patient bleeding to death in fifteen minutes.

Professor Billroth performed the operation of splenotomy. He does not consider leucocythæmia to contra-indicate this alternative.

"The patient was forty-five years of age, and had nine children; four years ago, she lost a large quantity of blood during a miscarriage. She had noticed two years ago a hard tumour in the left side of the abdomen, which gradually increased in size, and caused great pain. She grew thin, and for five weeks was troubled with a continuous vomiting. She was a middle sized, well-built, thin woman, of sanguineous temperament. On examination, she had an enormously hard spleen, an enlarged liver, and slight ascites; all other organs were normal. The relation of red corpuscles to white was as 5 to 1. Chloroform being administered, an incision was made a hand's breadth above and below the navel in the linea alba. The walls of the abdomen were very thin, and a few blood-vessels required ligature. On opening the peritoneum, a large quantity of ascitic fluid escaped, and the lower edge of an enormous spleen came immediately into the wound, also a portion of the lower edge of the liver; the omentum lay with the intestine behind the spleen: these structures were held back by large flat sponges. The spleen, which was nowhere adherent, was then slowly drawn downwards and outwards into the wound, as

was also the pancreas, with the ligamentum gastro-lienale. This ligament, and the splenic vessels, were ligatured in six portions in order to prevent any flow of blood. There was, however, a little from one of the vessels, but it was stopped by another ligature. These ligatures (hempen) were next cut short off, and the cavity swabbed out with sponges, to get rid of the bloody ascitic fluid. Two large drainage-tubes were introduced, the viscera and omentum replaced, and the external wound united by means of thirteen deep and four superficial sutures, and a compress applied. The operation lasted about three-quarters of an hour; no complications occurred, and all present were agreed that splenotomy was a relatively simple operation, simpler than most ovariectomies.

"The patient died four hours after the operation from an irrepressible hæmorrhage, brought on doubtless from the giving way of a ligature, during the exertion of passing a motion. A necropsy showed a large amount of clotted blood in the abdomen; and water injected into the splenic artery and vein revealed the fact that some small vessels had escaped ligature.

"Billroth states that, should he have occasion to perform splenotomy again, he would include a portion of the pancreas in the ligature, since it seems evident that, owing to the increased pressure in the dilated splenic vessels, their ligature had not a sufficiently firm hold, and slipped. The operation was performed antiseptically."*

Two other cases may here be given of splenic excision. One was in the instance of a man about forty years of age. The organ was extremely adherent to the surrounding textures, and great hæmorrhage followed its extraction. After ligaturing the larger vessels the galvano-cautery was applied to restrain the bleeding from the smaller branches. The patient died on the completion of the operation from loss of blood. The organ weighed fourteen pounds. The other was in a young man aged twenty, who was admitted into the West Bromwich Hospital and had leucæmia. After six weeks of ineffectual treatment he was operated upon for splenotomy by Mr. H. L. Brown. There were no adhesions nor any pedicle of a distinct kind. Four very large arteries were met with, one after the other, as the organ was slowly raised out of the abdomen, these being secured by double ligatures, as also their veins. There was no hæmorrhage. The patient rallied from the chloroform, but after five hours died suddenly, though there was no hæmorrhage after the operation. The viscus weighed eighteen and a half pounds. The operation seems to destroy by the terrible shock which is given to the system. Splenotomy may be regarded as unwarrantable. For more ample details on this particular question the reader is referred to the more recent works on Surgery.†

* Wiener, *Med. Wochensh.*, Nov. 5th, 1877.

† This article, which was written for "Reynolds' System of Medicine," has been republished in this work by the kind permission of Messrs. Macmillan & Co.

III.

DISEASES OF THE PANCREAS.

THE pancreas, like other organs, is subject to inflammation; it may be acutely, sub-acutely, or chronically inflamed, and such condition may be primary or consecutive. Pancreatitis is most frequently caused by the acute disease or enlargement of the neighbouring viscera. Adhesive inflammation agglutinates it to surrounding parts; the substance of the gland may pass into the suppurative state; or it may become indurated, softened, hypertrophied, or atrophied. Concretions may occur in the ducts and give rise to its organic disease. Lesion may pervade the whole or only a part of its substance. It is liable to be metastatically inflamed. Its most usual morbid condition is that of scirrhus, or carcinoma, and the head of the organ is the most prone to these deposits. In carcinomatous disease of the pylorus and the right lobe of the liver it sometimes becomes in like manner affected, and passes into chronic ulceration. In its structure are found fibrous, fatty, tuberculous, steatomatous, and calcareous materials.

The diseases of the pancreas were, until comparatively recent times, little understood. Its deep and hidden situation, its proximity to other organs, and an ignorance of its real functions, were the chief reasons why its morbid phenomena were less known than the lesions of other internal parts. The two former of these hindrances to the study of its pathology can never be overcome, and must needs prevent the attainment of that more exact diagnosis which can be arrived at when reviewing the symptoms of the other viscera. The ancient fathers of physic knew absolutely nothing of its functions or affections. Hippocrates does not even mention the pancreas, and for a long series of ages it doubtless received but superficial if any attention. We must pass on to the sixteenth century before any important reference is given to this gland. It has been very aptly remarked that this disregard in the works of the ancients was amply atoned for by the consideration which was bestowed upon it by the physicians who flourished two or three centuries ago. Vesalius absurdly imagined its office to be that of a cushion, to prevent the stomach, when full, from being injured against the vertebræ. Fernellius ascribed to its disorders diarrhœa, dysentery, atrophy, slow fevers, and other complaints. Schenklius believed it to be implicated in the production of a long catalogue of distempers; Riolanus conceived it to be the seat of hypochondriasis, intermittents, and many other

maladies; Sylvius and his followers, amongst whom was Hofmann, connected it with the production of fevers; Highmore said it was the source of apoplexy, palsy, and hysteria; and in the works of Bartholinus, Tulpus, Hildanus, De Graaf, Blancard, Portal, Morgagni, Rahn, and other of the older authors, illustrations of pancreatic disease are often recorded. It was not, however, until Wirsung discovered its proper duct that anything reliable was known of its functions. That was the starting-point of its more accurate physiology, as well as its more correct pathology. Haller classed it with the salivary glands, and succeeding physiologists, amongst whom may be named Majendie, Gmelin, and Lassaigne, concurred in this view, nor have the more recent physiological experimenters dissented from such decision.

A right conception of its structure and office is needful in the study of its pathology. It is a conglomerate gland analogous to the salivary glands, lying transversely across the abdomen, behind the stomach, its greater end or head being surrounded by the curve of the duodenum, and its lesser end extending to the spleen. It is composed of pinkish yellow polyhedral lobules which ultimately consist of arboriform ramifications of minute ducts. Kölliker calls it a compound racemose gland, the smallest lobules of which are rounded microscopical vesicles that possess a proper membrane, and a tessellated epithelium whose cells are remarkable for fat globules, and says these vesicles are connected with small excretory ducts, the latter emptying their contents into canals of larger calibre, and the canals discharging their fluid into the duct of Wirsung which opens into the duodenum.

According to one of the more recent analytical examinations of pure human pancreatic secretion, which was made by Turner, it is of an orange colour, of marked viscid consistency, and its specific gravity 1.0105. Leuret and Lassaigne pointed out its close resemblance to the saliva, with the exception that it does not possess sulpho-cyanogen. Turner confirms this fact.

With respect to the office which this gland subserves in the economy, it was not until lately that precise conclusions were arrived at. It is true that Eberle many years ago demonstrated that its secretion had the remarkable capability of fluidifying chyme loaded with peptones, and that Pappenheim and Purkinje maintained for it the possession of a distinct digestive power on protein substances; but it remained for Claude Bernard to show one of its most characteristic properties—the change which it exerts upon oleaginous matters subjected to its influence. His investigations went to prove that the pancreatic fluid emulsifies fat, and then converts it into glycerine and fatty acid. That it has also the property of exciting the transformation of starch into dextrine and grape sugar has been long known. Frerichs avers that the emulsification of fatty food is the result of the joint action of bile and pancreatic juice. Harley thus delivers himself on this point: “There is this important

difference between the action of these two secretions on fat, however, that while the bile merely emulsions and saponifies that portion of our food which enters the duodenum in the form of fatty acids, pancreatic juice, on the other hand, possesses the power not only of emulsifying and saponifying fatty acids, but also the neutral fats; indeed, its power seems chiefly to be exerted in the latter." Pancreatic juice is not the only agent which acts upon fat, the bile and intestinal secretions have a similar capability, though in much less degree, and perhaps the conversion is more complete when all these agents act conjointly. Bidder, Schmidt, Frerichs, and Turner believe it to have no influence on albumen. The most recent physiological experiments go to prove that the pancreatic fluid affects the digestion of albuminous substances, and this view is taken by Kuhne, Diakonow, Fudakowski, Schiverin, and Senator. The endeavour has also been made to show that saponification exerts a greater influence in the organism than assisting in the absorption of fatty matters. Radziejewski maintains that soaps can be absorbed and again converted to fat in the body.

This gland may, from a variety of causes, like other glands, differ in its functions, but our means of defining such differences are extremely limited. The intimate vascular and nervous connexion which subsists between it and the neighbouring viscera cannot do otherwise than give rise from time to time to morbid sympathies, and thus, in no trivial manner, influence the great processes of digestion and assimilation. The fluid may be generated in excess, in deficient quantity, or it may be almost or wholly wanting. From a parity of reasoning, founded on a pathological knowledge of other glandular structures, increase of vascular action, and more or less of hyperæmia, are doubtless the conditions coetaneous with and accompanying this augmented flow of the juice. There are instances of its having been given off in very large amounts, and when such is the case, if the lacteals cannot absorb the excess, it must needs then be regurgitated into the stomach, and ejected by an inverted action of the œsophagus, or pass away by the bowels. When secreted in morbid abundance, there are reasons for the supposition that it is then more irritating than normal, and if such be the case the gastric glands, as well as the intestinal surface, would be stimulated to undue action and increase of secretion. The affection known as pyrosis, or gastrorrhœa, has by some pathologists been referred not to the lining coat of the stomach alone, according to the theory once entertained, but also and mainly to the pancreas. Guersent held this view, and Copland says he maintained the doctrine prior to the first-named authority.

It is clear, from the most recent information which has been acquired relative to the pancreas, that in those instances in which a large quantity of viscid salivary-looking fluid is vomited, its production is, in part at least, referrible to this gland. In some examples of chronic diarrhœa, in which a ropy tenacious secretion was voided,

and which doubtless possessed many of the characteristics of saliva, this organ was regarded as the cause. Wedekind long ago believed that morbid excess of pancreatic juice gave rise to diarrhœa and dysentery. Therapeutic effects would sometimes seem to render such opinion not wholly chimerical, because we know that cholagogue purgatives are capable of producing that kind of discharge. This condition of excessive secretion may be merely functional and transient, or the result of organic lesion, and long continued. It is possible that the pancreas may be capable of taking on vicarious action, because we know the bowels are prone to do so in renal dropsy, and that this compensating tendency is one of the distinguishing qualities of secretory organs. The secretion may be diminished in quantity by the degeneration of the pancreatic substance into fat, or by its displacement by malignant deposits; also from mechanical causes, as when tumours of the stomach, liver, or other parts press upon the duct, or when it is blocked up by a calculus, or its outlet is obstructed by duodenal disease. When such is the case, the fæces are apt to be rendered dry and indurated. Brunner extirpated the gland, and then observed the contents of the alimentary canal to be deprived of their ordinary moisture. The copious discharge of fatty matters from the bowels, and which will be referred to hereafter, has long been attributed to the disease or impairment of the pancreatic juice. In some cases of carcinoma of the organ, its secretion has been abolished. Bernard asserts that very slight inflammation of the viscus renders its fluid morbid and unequal to its proper influence on the chyme; it is then, he says, less viscid, coagulates by heat and acids more imperfectly, and has far less power in the emulsification of fat.

General Etiology.—With regard to the causes of the diseases of the pancreas, all that can be said must rather be of an inferential than positive character, as the etiological facts are, when attentively reviewed, but meagre and inconclusive. That its affection, by extension of morbid conditions of neighbouring parts, not infrequently occurs, is beyond dispute. Claessen, however, considers this ascribed cause as overrated, and gives more importance to an inherent predisposition in the gland itself. The generality of continental writers, amongst whom may be named Hildebrand, have instanced the abuse of mercury as one of the most frequent causes of its maladies. The excessive use of tobacco has been named. The addiction to fermented and alcoholic liquors is doubtless a potent predisponent, and thus it is accounted by every authority of note. The long employment of cinchona bark has been supposed to be productive of similar results; such supposition, however, has not been founded on any reliable data. Rahn considered the predisposing cause a pituitous strumous diathesis affecting this in common with other glands. Gout and rheumatism have been blamed, and the obstruction to the menstrual discharge has also been put under the same accusation. Continued dyspepsia and chronic liver affections ought also to be enumerated. Metastasis

from the salivary glands and the testicles has been adduced; and from the accounts of Portal, Monnière, and Andral there are grounds for such supposition. A few cases are on record in which the pancreas was found diseased in infants, but the statistics of Claessen show that more than 50 per cent. of the cases occur between the ages of twenty-five and sixty.

General Symptomatology.—The physical signs of diseases of this organ are obscure. Palpation affords but vague and uncertain evidence, except perhaps in those cases occurring in thin and emaciated subjects, in whom the organ is malignantly enlarged, and forms an abdominal tumour. In health the viscus can very rarely be detected. It does not move by the act of respiration. Sir William Jenner says: "The healthy pancreas can now and then be just felt in very thin persons with small lax muscles, whose lower dorsal and lumbar vertebræ are somewhat curved forward. I may have satisfied myself that I have felt it half-a-dozen times in my life. The pancreas crosses the aorta and the spine; and when perceptible to touch, it is felt on deeply depressing the abdominal walls about a hand's-breath below the umbilicus, by then rolling the subjacent parts under the hand (the stomach and colon must both be empty)." This physician also says that in such thin persons it may be taken for malignancy of the transverse arch of the colon, or for aneurism of the abdominal aorta. No symptoms are pathognomonic of pancreatic disease; an assemblage of symptoms indicates the probability of its lesion. Pemberton placed more reliance upon negative than positive evidence, because he could not recognise any set of phenomena which were invariably present. Bright objected to this mode of reasoning, because he conceived it to presuppose an exactitude of knowledge, such as pertains to the other organs, which we do not possess. Siebert of Jena advocates the method of exclusion, a principle which would be erroneous if entirely relied upon; yet its partial adoption constitutes a great aid in leading to a right conclusion. The cardinal symptoms are, a dull, heavy, aching pain deep down below the centre of the epigastric region, which radiates through to the back, left shoulder, and left lumbar space, simulating the pain experienced in renal calculus, and is little increased by pressure; sickness and vomiting, sometimes thirst; constipation, which is occasionally alternated with diarrhœa; languor, emaciation, slight symptomatic fever, little acceleration of the pulse, and a clean tongue, which is not red, as in gastritis. In two cases recently recorded, one by Riboli, the other by C. Haller, and which inspection showed to have been unquestionable examples of Pancreatitis, there was scarcely any sympathetic fever.

As the disease progresses, there are acid eructations, pyrosis, gastrodynia, and frequent vomiting of a clear, ropy, tenacious fluid, and the patient complains of a sensation of constriction or tension at the præcordia, sometimes of heat and gnawing in that situation, and he experiences an increase of suffering after meals, and when the

decubitus is on the back. Coughing, deep inspiration, and bending the body forwards, augment the pain. Sometimes the pain resembles colic, by coming on in paroxysms, and being mitigated by the relief of flatulence. The vomited fluid bears a close resemblance to saliva, and is sometimes, as before observed, ejected in very large quantities. Frank and Trumpes state that they have known several pounds thrown off during the twenty-four hours. Abercrombie says that out of twenty-seven cases whose histories he examined, eight had frequent vomiting and thirteen had not this symptom. In thirty-nine cases selected by Claessen, thirty-five had vomiting. The bowels are confined in the majority of instances. The diarrhoea may be estimated as occurring in one-third of the patients, and the dejections are often a stringy, viscid mucus.

When the organ is acutely inflamed the secretion is doubtless suppressed, because, as Craigie observes, we know it to be the law of inflammation of glandular tissue, that its office is then suspended, and it is most likely during the declension of acute symptoms that the juice begins to be largely secreted. A secondary train of phenomena are exhibited by the progress of the malady, and these are mainly determined by the amount of tumefaction which the gland assumes, and the degree of pressure upon neighbouring organs which it exerts. If it press upon the ductus communis, as it frequently does, jaundice, saffron urine, dulness of the right hypochondrium, congested or absolutely inflamed liver, accompanied by pyrexia and ascites, may result; if upon the pyloric end of the stomach, vomiting becomes urgent; and if upon the abdominal aorta, palpation discovers pulsation, and auscultation a bruit similar to that of aneurism. In about one-fourth of the cases the enlarged organ can be detected. Pressure then *does* give pain. A hard, round, deep-seated lump is felt between the scrobiculus cordis and the umbilicus. The digestion being interfered with, the assimilative functions are affected; hence anæmia, and sometimes this hydræmic state of the blood is rendered more manifest by the want of normal tonicity of the blood-vessels, by arterial throbbing in the head and neck, and a humming in the ears. The brain remains clear to the last.

One of the most remarkable circumstances connected with disease of the pancreas is the occasional *discharge of large quantities of fatty matter from the bowels*. Bright thus speaks of the peculiarity in question: "The symptom to which I refer," he observes, "is a peculiar condition of the *alvine evacuation*, a portion, more or less considerable, assuming the character of an *oily* substance, resembling fat, which either passes separately from the bowels or soon divides itself from the general mass, and lies upon the surface, sometimes forming a thick crust, particularly about the edges of the vessel; if the fæces are of a semi-fluid consistence, sometimes floating like globules of tallow which have been melted and become cold, and sometimes assuming the form of a thin fatty pellicle over the whole, or over the fluid parts, in which the more solid figured fæces

are deposited." Immediately afterwards, Elliotson and Lloyd published similar cases, and the former gave a learned history of the affection, proving that this symptom had been observed by certain of the older physicians more than two centuries ago. Amongst the few instances more recently recorded may be named a very apt illustration by Mr. Clark, of Twickenham.

According to the present state of our knowledge on this particular subject, it may be said that this symptom is dependent upon the absence or a vitiated condition of the pancreatic fluid and deficiency of bile; and physiological experiments and pathological observation confirm this assertion, but the ultimate mode in which the conversion is effected is not so clearly understood. It must be held in remembrance that the distinguishing attribute of the pancreatic juice is to emulsionize fatty matters, but, as I before remarked, other animal fluids possess the same property, though in far less degree. In Bright's cases two conditions were noticed—malignant disease of the pancreas and ulceration of the duodenum; and that eminent authority connected this product very intimately, if not absolutely, with scirrhus disease. Scirrhus has in repetition been associated with fatty discharge, but it is *not* essential to its formation. In Lloyd's case there was no scirrhus. In that given by Mr. Clark there was no trace of cancerous disease, and the duodenum was quite healthy, but the proper duct was plugged up with calculi, the organ entirely converted into fat, and as a consequence, none of the pancreatic fluid could be generated. As previously remarked, the intestinal secretions, especially those of the duodenum, the pancreatic fluid, and the bile are the conjoint factors which emulsionize and saponify the fatty ingesta, but the pancreatic secretion is by far the most important agent in this office, and the disease of this gland explains the voidance of fat in the dejections.

PANCREATITIS.

Inflammation of the pancreas is an uncommon disease. Baillie, Meckel, and Andral do not even mention its morbid appearance, and the last-named declares that it has not been proved by necroscopy. Such assertion is, however, too absolute, as doubtless this, like other glands, does sometimes pass into the inflammatory condition. Wedekind, Daniel, and Portal speak confidently on the point; and the examples given by Lawrence, Crampton, Schmackpfeffer, Casper, Gendrin, and lately by Riboli, prove Andral to have been wrong. Its functions not being so important to the economy as the functions of certain of the other viscera, the fatal termination of its inflammation must be still more rare; hence its morbid state has but in few instances been verified, and the accounts which pathologists have given of its morbid anatomy have almost entirely consisted of descriptions of the results and complications of inflammation, or of those organic or malignant changes which more insidiously supervene.

The prominent signs of acute Pancreatitis are deep-seated dull pains in the epigastrium; distension, sickness, and the vomiting of a clear or greenish viscid fluid; thirst, faintness, moist tongue, constipation, and slight pyrexia. In the few illustrations which medical literature presents, enlargement could not be detected, partly on account of the distension, and partly because enlargement belongs to the chronic, not acute condition. The characteristics revealed by autopsy have been redness, brownish redness, or whitish yellowness of colour; augmented density, increased dryness and elasticity of the substance, which was in one instance dotted with bloody puncta, and uniform injection with infiltration of the interlobular cellular tissue, rendering the lobules more distinct. According to Morgagni, when the inflammation is intense and continued, the organ becomes softer and breaks more easily than in health. Gendrin saw its proper duct obliterated, and in Crampton's case the head of the gland was much tumefied. Lawrence thus describes what he observed: "The pancreas was throughout of a deep, dull red colour, which contrasted very remarkably with the bloodless condition of other parts. It was firm to the feel externally, and when an incision was made into it, the divided lobules felt particularly firm and crisp." Klob is of opinion that the inflammation commences in the interlobular cellular tissue. Craigie remarks that the redness and vascularity may be the effect of transudation after death; but adds, when these are accompanied by plastic effusion, pus, induration, or softening, there must have been inflammation. Rokitsansky, who regards this gland as being subject to the same morbid changes as those affecting the salivary glands, says, there is first tumefaction, then interstitial infiltration, and as the disease progresses a sarcomatous condensation of the cellular tissue, consequent upon plastic exudation into the areolæ; and that the congestion and reddening attack the acini, which appear to be confounded with the former, and the entire gland is enlarged and indurated. The effusion of coagulable lymph upon its surface may be productive of false membranes by which it becomes attached to one or other of the adjoining viscera, and sometimes the bands of union are dense and organized.

Depositions of purulent matter have been far more frequently seen than the primary conditions of inflammation, and various authors have recorded these collections, amongst whom may be named Tulpius, Bartholinus, Portal, Lieutaud, Gendrin, Percival, and Baillie. They more frequently occupy a portion than the whole of the gland. It has sometimes appeared as if the entire substance of the organ had been abolished and the capsule rendered a membranous bag filled with fluid. In other instances the pancreatic tissue has been found unchanged, its lobules being divided and floating as it were in pus. The suppurative alteration commences in the interlobular cellular tissue in small purulent deposits either in a portion or the whole of the organ, and these punctiform abscesses increase in size and number and ultimately coalesce. Rokitsansky says the cellular

tissue is then infiltrated with yellow pus, and the acini at a later period become fused. According to Gendrin, the glandular granules are very soft, of a reddish-grey colour, rendered smaller in size, although the whole organ is enlarged. The capsule is thick and inflamed, and when the suppuration is completed the matter is mostly collected in one cavity. It is occasionally mixed with pancreatic juice, which is then a clear yellowish fluid, containing some small curds. The matter is generally inodorous and creamy, but is sometimes greyish white or of greenish hue, of faint, mawkish smell, and is in some instances extremely fœtid. Portal saw two pounds of pus issue from one sac. It is always the result of inflammation. Its collection may be such as to produce injurious pressure on adjacent organs, when ulcerative absorption causes the matter to escape. Gendrin knew it emptied into the duodenum, Gautier into the stomach, and Haygarth into the intestines. It may be extravasated into the cavity of the abdomen, when death speedily ensues. The gall-ducts may be obliterated by pressure, as recorded by Percival and Haygarth, and the proper duct of the viscus may thus be destroyed.

Abscess is liable to occur in the pancreas from metastatic suppurative inflammation. It has repeatedly followed disease of the testicles. Portal cites a case in the instance of a man who had died after castration, where the spermatic cord wasted, and on autopsy a quantity of pus was found in the cord itself, and a considerable abscess in the pancreas. Antonine Petit adduces similar examples substantiating his opinion against the use of the ligature in extirpation of the testes. Tonnellie twice observed pancreatic abscess in puerperal peritonitis. Craigie has noticed it in the bodies of those who have died of ague, continued fever, and after the suppression of some habitual evacuation, as diarrhœa, hæmorrhoids, and the catamenia. There are no specific symptoms indicative of pancreatic suppuration. Rigors alternated with flushing, in conjunction with the indications enumerated above, might point to such inference.

The metastatic form of inflammation may quickly pass on to *ulceration*. Again, the ulcerative process may be produced by pressure upon adjoining organs, as when the gland is enlarged in malignant disease, and thus a fistulous communication may be established.

The older authors often speak of *gangrene* of the internal organs, as if it were not an uncommon pathological appearance. Bonetus, Becourt, and Greisel give instances of what they conceived to be such condition of this viscus; and Portal very strangely asserts that gangrene of the pancreas is a frequent result! Such statements are loose and incorrect, and modern morbid anatomy proves the absurdity of the assertions which were formerly advanced. Gangrene of the pancreas is exceedingly rare. Portal says he beheld the viscus of violet-red colour throughout, its substance being reduced to a pulp, and when opened a black fœtid fluid escaped. Gendrin gives an example which occurred after chronic inflammation.

Storek records an instance of *hæmorrhage* into the pancreas which occurred in a woman aged twenty-eight, in whom violent vomiting came on during the catamenial period, which discharge soon ceased. Dyspnœa, palpitation, faintings, and cold extremities followed. In the course of a month pulsation was felt at the epigastrium, costiveness and want of sleep became urgent, and vomiting, diarrhœa, and wasting ushered in the fatal issue. The pancreas weighed thirteen pounds, and was found filled with coagulated blood. Another case of which I took a note in my reading, but from what author I do not remember, happened in the person of a soldier in one of the military hospitals at Cadiz during the Peninsular war. He laboured under obscure abdominal disease which nothing relieved. The duodenum was found adherent to a reddish-brown tumour, which proved to be the pancreas. Not a vestige of its glandular structure remained. The capsule was a large sac the size of a child's head. It contained coagulated blood and grumous cerebral-like matter. Travers saw the gland ruptured by an accident.

Hypertrophy of Pancreas, and other Changes.—When there is *hypertrophy* of the viscus, such change has resulted from chronic inflammation, which may have been a long-continued and an insidious disease. An albuminous lymph is deposited in the interlobular cellular tissue, which at length becomes by the absorption of the watery parts condensed and solidified, and may present the appearance of opaque septa. The acini are not much altered, and the organ is rendered larger, and harder and drier. In some cases the hypertrophy is partial. It commonly presses upon the ductus communis, and there is jaundice; Holscher knew it so compress the duodenum as to cause fatal ileus. Riolan relates that he saw it as large as the liver; Tissot beheld it three times its normal size; Rahn found it to weigh four, Westenberg six pounds; Portal, Bedingfield, and others relate accounts of its greatly enlarged volume.

It is sometimes *atrophied*. In cachexia, dyscrasia, and the general debility consequent upon old age, when the fatal functions are depressed as in melancholia, and in cases where there are depraved digestion and mal-assimilation, it is sometimes discovered diminished. It also undergoes this change by the pressure exerted by diseased adjacent parts, as of the stomach, liver, spleen, and right kidney, and in aneurism of the aorta. Its arteries have been found ossified, and its bulk reduced; and when the cœliac and mesenteric arteries have been of contracted calibre from osteo-steatomatous deposit, it has been preternaturally small. Its consistency in this state is by no means uniform, it having been seen soft, hard, and of coriaceous tenacity.

It is occasionally *indurated* without being associated with malignancy. The glandular lobules are then the seat of this hardness, and it may accompany hypertrophy or atrophy. It may present a cartilaginous appearance. When thus observed, its colour has been reddish grey; and when cut, its substance has been drier and less

vascular than normal. In simple induration the hardness pervades the entire gland, and not a part of it, as in malignant disease. A number of authors have doubtless confounded this condition with scirrhus, amongst whom may be mentioned Morgagni, Haller, Tissot, Storck, Baader, and Portal. Modern morbid anatomists define this change with far greater accuracy, yet it is incontestable that its hardened state often passes into absolute scirrhus. It is the most frequently met with in middle life and the aged. Scholler, however, once witnessed it in the infant. *Softening* has been observed in scurvy, scrofula, malignant and eruptive fevers, and in dyscrasia. Such alteration of the organ's consistency is the effect of acute or chronic inflammation. Its softening is mostly associated with increase of size, it is readily lacerable, and is of grey or yellowish green colour.

Fatty degeneration of the pancreas is sometimes met with in accompaniment with fatty decay of the heart, liver, and kidneys, and, according to Rokitansky, this appearance has mostly been found in confirmed drunkards. Fearnside records an instance in which the whole gland was in a great measure converted into fat, and he points out how it differed from mere deposition in the interlobular cellular tissue. Cruveilhier remarks upon the difference between transformation of the glandular substance and fat interposed in the laminous texture. The microscope exhibits the partial conversion of the lobules into and their utter displacement by fat. The entire organ may be transmuted into one fatty mass.

I believe *Scirrhus* to be the most common malady affecting the pancreas. It may be located in one part or pervade it entirely. In the majority of examples it is the duodenal end which is diseased, and the gland generally becomes enlarged, but in exceptional cases there is diminution of bulk. I also believe this to be very rarely a primary formation, for other organs nearly always, when carefully examined, exhibit the same heterologous product. When the affection has for some time existed, adhesion to adjacent structures ensues, and there may be open ulceration. By pressure of the tumour ulcerative absorption takes place, and thus may eventuate perforation of the diaphragm, erosion of the vertebræ, and rupture of the vena cava. This kind of enlargement has been known to constrict the abdominal aorta and simulate aneurism. The duodenum by its proximity is more frequently implicated than any other part; its mucous membrane becomes ulcerated, and there is adhesive inflammation. The hepatic and common ducts become contracted, sometimes they are blocked up and absolutely disorganized, and thus the functions of the liver are interfered with, and icterus comes on. The natural secretion of the gland is diminished in quantity, or so changed in quality as to irritate the lining membrane of the upper part of the alimentary canal; again, the cancerous deposit sometimes fills up or destroys the duct, when no pancreatic juice can pass into the bowel, the characteristics of the chyle become

changed, and the fæces are rendered dry. Dr. Owen Roberts, of St. Asaph, has kindly given me the particulars of two cases in which the organ was thus affected, and which recently came under his notice. One was in a woman of sixty-five, who for long had pain in the back, and who died considerably emaciated. The pancreas was found large and hard at the duodenal end, and the common bile duct was obstructed, which accounted for the jaundice and absence of bile in the stools. The other case was in that of a medical man, whose pancreas was thus diseased, but in him there had not been pain in the back nor any jaundice.

I will now relate an example of scirrhus of this organ which came under my own observation, and which will indicate the kind of sequents and complications which may arise amongst the viscera, and in what an insidious manner the disease may be present in the part.

A broad, fat woman, aged fifty-four, single, and a domestic servant, was admitted into the Tunbridge Wells Hospital in the month of July. A few weeks before she came Mr. Marsack visited her, when he found the abdomen large and tense. She did not complain of pain on pressure, the pulse was not quick, and the tongue was clean. She had, however, pains in the abdomen, which from time to time came on in great intensity. On admission she suffered much from abdominal pain, and frequently got out of bed to urinate, but could only pass a few drops. The abdomen was tense and rounded, and palpation at once detected fluid. On percussion of the umbilical region, a dull, dead sound was elicited. At the sides near the crests of the ilia there was resonance. She felt that if she could pass urine she would at once be relieved. She said with much certainty that the enlargement of the abdomen had a few days before come on suddenly. A catheter was passed, with much difficulty, into the bladder, when only a few drops of urine came away. There were no symptoms of suppression. Her mind seemed quite collected; and she talked rationally. She was ordered a diuretic, to have a warm bath, and afterwards some castor-oil. On the next day the report was that the bowels had been opened by the oil and an enema, and she complained of much pain with an urgent desire to pass water. Mr. Marsack passed a catheter after much trouble, as the meatus was organically narrowed. Only a few drops were withdrawn. An opiate was prescribed. She became much worse, the pulse began to flag, and it was evident she was going to die. She sank in the course of a few hours, her mind being clear to the close.

On inspection the body was large, fleshy, and fat. On making a free incision down the mesial line, a subcutaneous stratum of pure fat of one inch thick at the sternum, and three inches thick below the umbilicus, was shown. On opening the abdominal cavity a large and full stream of turbid yellowish serum instantly gushed out, there being nearly three quarts. The peritoneal covering of the viscera

and the parietes was inflamed. Over a large extent of surface, it was thick and opaque, and large pieces of lymph floated free in the serum. The intestines were in some places of a pinkish red; and more particularly towards the mesenteric attachments. They were mottled, and at intervals large red patches were seen. Their coils were welded together by organised adhesions, and wherever they came in contact with the abdominal wall they were adherent. On handling the ileum and colon they felt præternaturally thick and hardened. The stomach was adherent to neighbouring parts, but it exhibited no disease on its mucous surface. The pancreas was found of scirrhous hardness, and it had quite lost its ordinary consistency when pressed between the fingers; it was of irregular outline, and its serous investment was red and ramified. Near to the duodenum it presented an open ulcer. It was attached to the stomach, colon, and duodenum. The liver was pushed up under the diaphragm, and the diaphragm was exceedingly arched. The liver was passing into fatty decay, but on making various sections it exhibited no abnormal deposits of the carcinomatous character. The spleen, kidneys, and uterus and its appendages gave no evidence of disease. The bladder was exceedingly small, and utterly empty. On placing specimens of the pancreas under the microscope, there was no doubt as to the malignant nature of the deposit in that organ, cancer cells being seen in abundance. There were certain facts of pathological interest associated with the case. Inspection revealed the great difficulty, or rather impossibility, of diagnosis. The patient had no outward and visible signs of malignancy whatever, but those conditions which are opposed to the cancerous formations were prominently present. The peritonitis doubtless originated in the irritation set up by the morbid growth. The patient had up to a recent date pursued her occupation. The pulse and tongue did not tell of the widespread mischief which unquestionably had for some time been going on within her. When she lay on her back there was some lateral resonance, more especially on the right side, which was difficult to account for on the supposition of the presence of fluid, and that she did contain fluid was most evident by the thrill imparted to the flat hand. This lateral resonance was after death explained by the agglutination of the intestines to the abdominal walls. It is very presumptive that she had had cancer of the pancreas for a long time when its enlargement and pressure induced fatal peritonitis.

The *Encephaloid* form of cancer is far less frequently found than the kind above described, and when it has been noticed there has generally been also medullary sarcoma in some other organ. It is observed as soft, curdy, or cerebral-like matter. In two cases given by Abercrombie, the encephaloid deposition was arranged in yellow and white layers. The consequent open ulceration may give rise to fatal hæmorrhage, as related by Vidal.

Da Costa has professed to diagnose cancer of the pancreas from its

other maladies, but the truth is we have no just rules for observance to point out any real distinctions. Pain at the epigastrium, sickness, vomiting, and constipation have been instanced as cardinal symptoms by Claessen and others, but they have also been given as the symptoms of simple inflammation of the gland, therefore they cannot be regarded as pathognomonic of carcinoma.

Bright once saw *Fungus Hematodes* of the pancreas, and the same statement has been made by other authors, but it is extremely rare. There are specimens of *Melanosis* of the organ in the museums of the Royal College of Surgeons and St. Bartholomew's Hospital. *Tubercle* has been noticed by a few pathologists, but only in phthisical and strumous subjects, and as the accompaniment of the same condition in other organs. *Steatoma* is another product which some writers have mentioned, but I believe it to have been but another name for tubercle. As in the salivary glands, *calculous concretions* are formed in the pancreas. They are mostly discovered in the main duct, but they have been also observed in its minute ramifications, presenting the appearance of small particles of white earthy matter. They are of irregular surface, and vary greatly in size and number. They may not be larger than a millet-seed or equal to a hazel-nut, and nearly one hundred have been counted. Schupmann found one measuring one inch and six lines in length, and which weighed more than three drachms. Wollaston and Fourcroy proved them to consist of phosphate of lime in combination with some animal matter. *Cysts* have been spoken of, but dilatations of the ducts have been mistaken for such growths. Cysts in this organ may have their origin in areolar expansion or from distension of the duct; the same occurs in ranula with obstructed submaxillary duct, and a like cystiform dilatation is sometimes seen in the Fallopian tube. Turner, of Edinburgh, saw an excellent illustration of cystiform dilatation of the pancreas from obstruction of the duct, in the body of a man who died with cancer at the head of the viscus. The pancreas at first sight looked like a multilocular cyst; but examination showed the cyst-like dilatations to be expanded acini filled with the thickened secretion of the gland.

Diagnosis of Diseases of Pancreas generally.—It is only approximately that the diagnosis can be accomplished. The functional affections of the pancreas cannot be recognised, and it is only when its maladies have made progress, and the other viscera have become implicated, that they can with anything like certainty be inferred. The low degree of sensibility with which the organ itself is endowed, and the great sensibility of organs with which it lies in juxtaposition, its depth in the abdomen, the inconsiderable effect which its lesion exerts on the circulatory, nervous, and secretional systems, and the resemblances which the diseases of the liver, stomach, and duodenum bear to those of this gland, are some of the many causes constituting this difficulty. Strict regard should be paid to the symptoms before enumerated, and the complaints in-

cident to the stomach, liver, spleen, and duodenum should as far as possible be excluded. Kreysig and Hohnbaum place most confidence in the sickness and the slimy fluid which is vomited. Wasting, and the discovery of particles of fat in the fæces, are by Lussanna considered the most reliable signs. But we now know that fat may be passed in the alvine evacuations when the duodenum and not the pancreas is diseased: hence this system is not pathognomonic. Again, with regard to the pain: Abercrombie says there may be great disease with little or no pain. Swelling of the parotid glands has been noticed as a vicarious affection. Cancer of the pylorus, enlargement of the liver, spleen, mesenteric and mesocolic glands, encephaloid tumours, impaction of fæces in the transverse colon, should, if possible, be excluded. Da Costa commends the exclusive method, and doubtless the attempt to diagnosticate will be facilitated by the observance of such means in addition to a due regard to those conditions which are looked upon as the more positive indications.

TREATMENT.—From what has now been said relative to the difficulty which there is in diagnosticing disease of the pancreas, the treatment must needs be more doubtful and less satisfactory than the treatment addressed to organs whose morbid conditions can with greater certainty be interpreted. There are no medicines which have a special power in counteracting its maladies. The treatment must be conducted on those general and acknowledged principles which would be equally applicable to other internal parts. If we believe acute inflammation to be present, the ordinary antiphlogistic measures should be adopted. Cupping or leeches may be used; and if there be hot skin, quick pulse, and great pain, and the patient be robust and strong, moderate general blood-letting may be employed. Emollient cataplasms, hot and repeated fomentations, terebinthinate and opiate epithems often give relief. When the more acute symptoms have declined, blistering tartar-emetic ointment, croton-oil liniment, belladonna and opiate plasters, or the linimentum hydrargyri, or the emplastrum hydrargyri, can be tried. If the pancreatic affection be considered metastatic of parotitis, a blister should be applied to the parotid gland. The bowels should be kept open by laxatives, such as castor-oil, the confection of senna, or the compound rhubarb pill, with a little of the extract of henbane. The empirical plan of some of the older physicians, of giving an opiate at bed-time and a gentle aperient in the morning, may be followed. If sickness and vomiting be urgent, hydrocyanic acid, and small doses of morphia in a mixture of mucilage or almond emulsion, are likely to be serviceable; effervescing draughts and creosote in pills, and small quantities of brandy in iced water, may be given. If there should be much pain, opiates in some form must be had recourse to; and if the irritability of the stomach be such as to reject them, they should be administered hypodermically or by enemata. If we are impressed with the conviction that the affection

is carcinomatous, palliatives can alone be used with advantage, and the surest of these is opium. Mondière, in such cases, gives importance to revulsives, and praises the use of the moxa. The diet should be bland and nutritious, such as nourishing soups, jellies, milk, and farinaceous food. If there be acidity in the stomach, milk and lime-water should be given. Rest in the horizontal posture should always be insisted upon.*

* This article, which was written for "Reynolds' System of Medicine," has been republished in this work by the kind permission of Messrs. Macmillan & Co.

IV.

ENTERALGIA.

DEFINITION.—Enteralgia is a painful affection of the intestines, of neuralgic character, generally accompanied with constipation and flatus. It may come on gradually in a dull and obtuse manner, but in the great majority of instances its supervention is sudden, and the pain is sharp and violent. It is, correctly speaking, visceral neuralgia, and mostly occurs in neurotic individuals. The common accompaniments of inflammation are absent. The skin is cool, the pulse is not accelerated, and the heart's impulse is rather subdued than augmented. Its attacks are paroxysmal. It shifts its position in the abdomen. It is often a pain reflected by distal disease, but if continuous it may end in inflammation.

SYNONYMS.—It has been variously named Enteralgia, Tormina, Dolor Colicus, Colicodynia, Spasmus Intestinorum (*various Authors*). Ileus Spasmodicus (*Sauvages*); Spasmus Ventriculi (*Wiessner*). Some writers have confounded it with Gastrodynia, or Gastralgia. In the vernacular the affection is identical with Pain of the Intestines, Spasm of the Bowels and Belly-ache, Pain in the Belly, Gripes, and Cholick, or Cholick Colic.

CAUSES.—The causes of this complaint are to be regarded as those which are *Predisposing* or *Remote*, and those which are *Proximate* or *Exciting*.

Under the head of the first-named may be mentioned the influence of sex, and it is beyond dispute that females are more prone to this affection than males; their greater sensitiveness, and their susceptibility to moral emotions, favour the development of nervous diseases; and the sympathy of the uterus and its appendages, as familiarly known, in marked manner reacts upon the cerebro-spinal and ganglionic systems. The particular temperament of the patient will confer a proneness to, or tend to give an immunity from, this complaint, those who are nervous and melancholic being more liable to it, and those who are leuco-phlegmatic or lymphatic being less susceptible. The condition of asthenia conduces to the production of enteralgia, and a lowered vitalism is often associated with an exaltation of sensibility. The weakness resulting from acute or chronic disease, by depressing the tone of the system in general, and the functional power of the great nervous centres in particular, constitutes a common predisponent, and the morbid action of the

nerves proper to some part or parts is not an unusual occurrence. During the convalescence of fever, after visceral inflammation and large losses of blood these attacks are not infrequently witnessed. Excessive lactation, by subduing the general strength, often enters as an element into the remote causation; and the same may be said of menorrhagia, the lochia, hæmorrhoids, leucorrhœa, and like affections. Long-continued secretions and periodical discharges, by deteriorating and diminishing the vital fluids, are followed by the result in question.

Amongst the proximate or exciting causes is to be mentioned the malarial influence, and in tropical countries and aguish districts there is no doubt it often merits the accusation. Atmospheric humidity, low and damp situations, and a naturally cold and wet climate, form endemic conditions which foster the development of neuralgic ailments: and the truth of the converse is unquestionable, that in places of greater altitude and in a purer and drier air they are not so prevalent. When hot and sunny days are followed by frosty nights, the body being suddenly chilled, and thus the blood being determined to the internal organs, these anomalous pains are often produced. Wet clothes and wet feet give rise to the same affection. Mental fatigue, as after long-continued and great intellectual efforts, has by some writers been enumerated. In those persons whose vocations are such as to demand a continued strain of thought, or whose hopes and fears are excited by speculation, as in commercial enterprises, or those whose faculties are stimulated by some career of ambition, in all of whom the nervous functions are brought into great energy of action, these neurotic ailments prevail, sometimes being located in one organ or part, sometimes in another.

There are also proximate causes, which are strictly speaking pathological—which are referrible to foregoing and obvious forms of morbid change, especially to those changes which take place in the blood, and which constitute a humoral causation to the nervous phenomena. It has been observed by Simon that central neuralgia arises with the utmost frequency in anæmiated and debilitated persons; and we know how apt it is to follow hæmorrhage, and be associated with malnutrition when no primary structural lesion exists. During the latency of the gouty, and in the rheumatic diathesis, when the *materies morbi* of those respective affections has accumulated in the system, before its explosive decomposition has been evinced by local inflammation and excessive secretional evacuation, its presence may be such as to generate that humoral disorder, which first affects the cerebro-spinal and ganglionic centres, and then the nerves proper to visceral organs. In chorea, which is consequent upon some perversion in the development of the blood, caused by the alteration of physical qualities, or the chemical relations of that fluid, or it may be by the absolute generation of some new product, we have ample testimony of the immediate effect produced on the nervous system. And in Bright's disease we are continually presented with examples of the same

consequence, caused by the retention of effete and poisonous matters in the circulation. Todd pointed out the fact that epilepsy, as associated with this renal affection, is characterised by greater severity in its seizures the longer the interval between the fits, because the irritant materials revulsed into the circulation are then in accumulation and act with greater force. The fact that defective blood-development, or its contamination by lesion of the depurative organs, is productive of nervous disorders, is well shown by the administration of suitable remedies. In anæmia and chorea we every day observe the beneficial effects of ferruginous medicines, and see how pains diminish in degree and frequency, and how the disorderly movements of the voluntary muscles become subdued. In hyperæmia, more especially in that form which has been denominated active hyperæmia, pressure upon the nervous filaments gives pain; and although such far more frequently obtains with the solid abdominal organs, yet it doubtless is an element entering into the causation of enteralgia.

In organic disease of the brain and spinal cord pain is generally reflected to some distant part, and such is the common case in lesion of the last-named organ. In caries of the vertebræ, as I have in repetition observed, the reflected visceral pain has been a constantly recurring sign. Some years ago I saw, at the request of a distinguished provincial surgeon, a lady who for many weeks had been under his care, and whose case he regarded as one of persistent enteralgia caused by some offending ingesta or some impaction in the bowels. I believed, however, that this pain in the bowels had a more remote origin—that it was spinal. The examination after death revealed vertebral caries and softening of the cord. Sometimes the distal pain can be traced to mechanical injuries of the nerve-centres. We know that in children there is the closest connection between encephalic disease and disorder of the bowels. In primary disease of the solid abdominal viscera, especially in that of the liver and spleen, irritation is not infrequently extended to the intestines; sometimes neuralgic pain of an intermittent or remittent character eventuates; while in active congestion of the liver, or in that sudden distension of the spleen which occurs in periodic fever, intestinal pain is no unusual symptom. The intimate sympathy which subsists between these parts can be well understood when we consider their ganglionic connexion.

Amongst the more common causes may be mentioned indigestion and flatulence. When the ingesta have not been properly converted into chyme, but have passed down into the lower bowels only partly disintegrated, they give rise to irregular spasmodic attacks of pain by acting, as it were, like foreign bodies in the canal. In this way shell-fish, dried salt meats, pork, badly cooked food, unripe fruit, crude vegetables, and the like, are followed by the affection. That flatus very often produces Enteralgia is a fact so familiar as scarcely to merit comment; but numbers of the older authors speak of this cause with

much emphasis.* Wiessner says: "Flatus similiter etiam ventriculorum doloribus spasticis afficiunt. Hæc enim toti tractui intestinorum molestissima affectio vel ipsi ventriculo proxime nocet, vel partium distentione stomacho proximarum. Ex hisce imprimis colon transversum, ante inferiorem ventriculi curvaturam extensum, sedem aëri incluso quam maxime incommodam parat."† The movement of gases from one part of the intestines to another accounts for the shifting of the pain. Constipation is another and frequent cause of the complaint. Indurated masses of fæces become impacted in the cæcum, sigmoid flexure, or transverse colon, and attacks of sharp, twisting, rolling pain come on from time to time, and are not permanently relieved until the irritative contents of the gut have been voided. Sometimes a large gall-stone or a concretion is the cause. Morbid secretions, acrid substances, acerb fruits, septic food, such as putrid game and bad cheese, stimulating liquors, and sour drinks are liable to produce Enteralgia. Chemical agents and medicinal compounds are followed by a like result. The sensitive fibriles proper to the lining tunic of the digestive tract, by coming in contact with the fore-named, become irritated, and there may be great pain when the motor nerves are but slightly influenced in their functions. In lead-poisoning the intestinal nerves are particularly prone to exaltation of sensibility.

SYMPTOMS.—The mode of accession is generally sudden, the pain being sharp, shooting, or twisting; but in some instances it comes on more gradually, and a rolling or aching of the bowels is described. The affection is in the majority of cases first felt at the umbilicus or in the right iliac fossa. The paroxysms increase in degree and frequency, the intervals from suffering being irregular and of varied duration. The pain, especially in the earlier stage of the attack, alters its position. It is rather relieved than aggravated by pressure. The skin is often cool, the face pale, and the pulse, instead of being accelerated, is rendered slower than natural. In the severer cases the stomach sympathises, and sickness and vomiting may supervene; and when the malady becomes intensified and the agony excessive, the entire surface is bedewed with a chill, clammy perspiration, the extremities becoming cold and of venous hue, and the general aspect that of collapse. Costiveness is the common accompaniment, and percussion displays an overloaded state of some part of the colon, generally at the cæcum or sigmoid flexure. When flatus is the chief cause, there is intestinal distension, and such notably obtains in the large bowel. On palpation nodulated eminences are felt, which quickly alter in their configuration, and which are caused by the constricted and distended portions of the tube. With the expulsion

* Rhodii, "Obs. Med. cent. iii.," Palav. 1657; "cent. ii.," obs. 70. Lieutaud, "Hist. Anat. Méd.," tome i., p. 7, Paris, 1767. Marehand, "Diss. de Cardial. flatul.," Argent, 1754. Weikard, "Vermischte med. Schriften," Frankf., 1778, b. ii., p. 143.

† "De Spasmo Ventriculi," p. 13.

of the confined gases the patient derives signal and immediate relief, and sometimes the amount evolved is very considerable. The noisy flatulent movements—borborygmi—which are often heard in the canal frequently constitute a marked symptom in hysterical females whose *primæ viæ* are generally disordered, and whose assimilative functions are imperfectly performed. The attacks of enteralgia may be intermittent or remittent. Sometimes they terminate with all the rapidity with which they were ushered in. Although, as a rule, enteralgia is apyrexial in character, yet inflammation sometimes occurs; and then the surface is warmer, the pain more fixed, and the circulation excited. In hysterical women uterine disorder is the usual concomitant, and the enteralgic pain will often be found in association with spinal tenderness. In such instances percussion on the spinal processes should not be omitted, and not infrequently hyperæsthesia of the abdominal surface is a prominent sign. When the subjective symptoms are referrible to organic disease, and are evidently reflected, the cerebro-spinal axis and the solid abdominal organs should respectively be examined, and the kind of lesion there existent be as far as possible correctly estimated. This neuralgic pain of the intestines is occasionally seen as a symptom caused by ulceration and congestion of the uterus; and it may come on after the sudden retrocession of cutaneous eruptions and the exanthemata; also, as before remarked, it may follow profuse critical evacuations, the repeated loss of blood by hæmorrhoids, or other sources of debility.

The symptoms are modified or terminated, or the attacks rendered less recurrent, by the accession of certain morbid conditions taking place in the system. The advent of a powerful diaphoresis, the supervention of diarrhœa, the flow of the catamenia, the lochial discharge, the occurrence of epistaxis, the formation of an abscess, or the return of some long-habituated secretion, are known to exert such influence. A fit of gout, or the development of acute rheumatism, seem on derivative principles to lessen this nerve-pain, and diminish in or remove from the organism those conditions of irritation which particularly affect the cerebro-spinal and ganglionic nerves. It sometimes happens, when the affection comes on in females, that a very large secretion of pale or almost colourless urine is at once succeeded by the mitigation of the attack. In some cases the abdominal and thoracic muscles are spasmodically contracted; there are rigidity of the recti and a loss of motor power in the intercostals, the chest is fixed, and the breathing is oppressed. When the seizures become repeated, they are liable to be characterised by greater severity, the exaltation of the nervous sensibility doubtless becoming augmented by continued irritation. The duration of the symptoms is always most uncertain, as much will depend upon the kind of fundamental cause by which they are produced: it may, however, be regarded as the most usual fact that the more severe the fit the shorter will be its continuance. In children spasmodic pain of the bowels is soon productive of

disorder in the digestive functions, and irritation in the alimentary tube is soon followed by the ordinary conditions which characterise infantile convulsions. According to M. Billard, the child cries suddenly and loudly, the face is contracted, the limbs are stiffened, the belly is tender to the touch, there is tympanitic distension, and the attack is often relieved by the expulsion of large quantities of gas *per anum*.* The alvine evacuations are generally suspended, and frequently there are vomiting and carpo-pedal contractions; in young infants there is tossing of the arms, the legs are drawn up to the abdomen, and often in the course of time green and offensive stools are voided. Frequently upon investigation it will be found that the mother's milk, or the artificial food which has been given, is the cause.

PATHOLOGY.—In the discussion of this part of the subject, and in speaking of the pathology, those morbid conditions may first be noticed that consist of impairment of the functions of the bowels, which are characterised by alteration of sensibility, and which are often in association with a lowered state of vitality in the economy; but, as in all functional affections, the real origin of the complaint cannot always be detected, and remains an uncertain inference. It frequently happens that when some irritation of the mucous surface of the bowels is the cause, gases become generated, and painful dilatation of some part or parts of the tube is the consequence. It is probable that a great portion of the gas is secreted from the blood, for the flatus is often produced too quickly and in too great abundance for the presumption that it comes entirely from the decomposition of the ingesta. By this distension of any particular section of the gut there is loss of tone, the contractile power of the muscular coat may be almost or entirely abolished, and the pressure on the sensitive nervous fibriles occasioned by such dilatation will well account for the complaint, because there may be asthenia of this part of the ganglial system in accompaniment with morbid exaltation of sensibility. This irritation of the peripheral nerves, caused by harmful ingesta, concretions, vitiated secretions, and the like, affects not only the intestines themselves, but other organs also; and thus it is that the heart and diaphragm are functionally influenced, and hence the depressed circulation and difficult respiratory movement so commonly witnessed in the more violent examples of the ailment. As pain is often to be regarded as the prominent expression of some malady pervading the entire system, and as the functions of any organ may be thus disturbed, it not infrequently occurs that one or other of the viscera is the seat of such disease; and thus it is that in contamination of the blood spasmodic or neuralgic pain of the intestines may result. In saturnine poisoning there is ample illustration of this fact; the poison is transferred into the circulation, the secretions are arrested, and fits of agonizing pain

* "Traité des Maladies des Enfants nouveaux-nés et à la Mamelle." 8vo, Paris, 1828.

are felt in the bowels: and so it doubtless occurs in those dyscrasial affections in which the fluids of the body are degraded by changes more occult, and by the operation of agents less plainly comprehended. In gout and rheumatism, and in Bright's disease, the cerebro-spinal and organic centres are secondarily influenced through debasement of the blood. When gout is retrocedent or rheumatism suppressed, their peccant materials are revulsed upon and irritate some of the internal organs; and in Bright's disease, when the urinary excreta are imperfectly eliminated, the disturbance of the nervous system is exemplified not only in the exaltations of sensibility in the viscera—neuralgia—but in perverted motor function, as evidenced in the reflex action of vomiting and diarrhœa. In simple asthenia, when there is excess of emotional and other motility, as in hysterical females, the kinds of pain in question are readily developed; and if it cannot be said that structural changes do not exist, at least they cannot be indicated.

When organic disease in some cognisable form does constitute the cause of enteralgia, the examples may be most varied in their locality, degree of objective symptoms, and the kind and amount of their structural alteration. When the primary lesion is in the cerebro-spinal axis, chemical, physical, and mechanical aids to diagnosis are of no avail, and we are compelled to rely upon analogies and subjective representations. One of the most frequent pathologic conditions is that of hyperæmia, which produces irritation and reflex phenomena. According to Brown-Séquard, when the afflux of blood or other morbid change is at the posterior parts of the cerebro-spinal axis, hyperæsthesia is the common result; and it would seem that interruption of continuity of the vaso-motor nerves is the fundamental cause of vascular dilatations. In spinal irritation and hysteria reflex visceral pains thus doubtless arise; and it may truly be affirmed that the causes of spasmodic and neuralgic pains are more commonly central than peripheral—in figurative language, they are more frequently referrible to the battery than the conducting wires. In positive inflammation of the cerebral and spinal tissues abnormalities of function must necessarily arise. The nerves are seldom diseased. Albers and West in only exceptional cases found the vagi morbid on inspections after whooping-cough. Bichat repeatedly examined the nerves in diseases of the viscera without discovering pathologic change. But according to the testimony of various writers, and from my own observations, the nerves are sometimes inflamed, and are subject to other morbid alterations. The neurilemma is the part most prone to inflammation, and Craigie asserts that such condition is a common cause of neuralgic pain. In tetanus and sciatica the entire nerve has been seen red and swollen. The sympathetic ganglia are sometimes diseased; there may be vascularity of the cellular tissue interposed between the elements of the ganglia, and the ganglionic substance has been seen enlarged and indurated. It is also highly presumptive that there may be molecular change in the contents

of the ganglionic corpuscles. Neuromatous formations may be the cause of enteralgia. As I have already remarked, the more common and obvious conditions of visceral disease may produce enteralgic pain, such as thickening of the inner tunics of the bowel, whereby impediment is given to the contents of the tube; an ancient band of lymph giving rise to constriction; or by some abnormal growth pressing upon the gut. And in the various organic affections to which the solid organs are liable, reflected enteralgic pain is no unusual result. In diseases of the urinary and generative organs of both sexes the kinds of abdominal pain now spoken of not unusually supervene. Ulceration of the uterus and impaction of the ureters sometimes cause enteralgia.

DIAGNOSIS.—The diagnostic indications of enteralgia are sudden, darting, plunging, or twisting pains, which come on paroxysmally, the attacks varying in their degree of severity and in their duration. The intervals between the seizures may be almost or altogether free from suffering. The pulse remains unaltered, the surface is cool, and the facial expression is that of pallor and pain. There is moist tongue, no thirst, the bowels are confined, and flatulent distension is the common accompaniment. Pressure on the abdomen relieves rather than augments the pain, and it is not unusual for the patient to press his hands on his belly during the paroxysm as a means of affording relief. The expulsion of gases from the large bowels gives immediate ease; and sometimes the advent of diarrhœa at once cuts short the complaint. In inflammation of the bowels pressure confers pain, the skin is hot and dry, the pulse quick, the face flushed, the secretions and excretions are diminished, the patient cannot turn and twist about in bed as he can in enteralgia, and the objective symptoms of symptomatic fever are more or less proclaimed. In inflammation the pain is confined to one particular part of the abdomen, and only gradually becomes diffused. In enteralgia it shifts about with great celerity. In ileus there is vomiting, and at length of fecal matters; a lump can often be felt, and the suffering, as in inflammation, does not intermit. When this neuralgia of the bowels is from impaction of feces, palpation and percussion will be our guides; if from concretions or mechanical obstructions, the history of the case and collateral circumstances will conduct to a right decision; and if from irritative secretions, a flux generally supervenes. If reflected by distal disease, as in hepatic, splenic, and renal ailments, those organs should be carefully examined. In neuralgia the pain radiates round to the back, generally at one side. In the passage of renal calculus the pain is in one side; it darts down towards the pubes and thigh, and in the male there is retraction of the testicle. In rheumatism of the abdominal muscles the disease pervades some other part. In hysteria the spine should be examined; and when from this cause, often a copious discharge of colourless urine will give relief. In lead-poisoning there will mostly be dropping of the wrists, and the blue line on the gums.

TREATMENT.—The remedies first indicated are those which are most likely to abridge and mitigate the sufferings of the paroxysm; and with this view antispasmodics and anodynes may be prescribed, such as opium, chloric æther, henbane, conium, camphor, ammonia, and similar agents. At the same time hot fomentations, sinapisms, terebinthinate epithems, or stimulating and rubefacient liniments, may be employed. The surface should be kept warm and diaphoresis promoted, which can be best accomplished by the patient first putting his feet and legs into hot mustard and water, and then going to bed. The warm bath and sedative enemata are excellent auxiliaries. Sometimes anodyne embrocations, addressed to the spine, do much good. In the more chronic neuralgic affections, I have long been in the habit of prescribing a liniment composed of laudanum, chloroform, the extract of belladonna, and the linimentum camphoræ. The bowels should afterwards be cleared out by mild laxatives, such as castor-oil, the compound rhubarb pill, extract of colocynth in combination with extract of henbane, or the galbanum pill, or the confection of senna. When we believe the fundamental cause to reside in the solid viscera, or in the cerebro-spinal axis or ganglionic centres, our measures should then be addressed to such parts, and our aim be to lessen the general morbid excitability of the nervous system.*

* This article, which was written for "Reynolds' System of Medicine," has been republished in this work by the kind permission of Messrs. Macmillan & Co.

V.

PERITONITIS.

DEFINITION.—An inflammation of the serous membrane which invests the abdominal organs and lines the abdominal cavity. It may be partial or limited, or it may be diffused over the entire inner surface of the peritoneal sac. Effusion is almost the invariable consequence, and examination after death discovers serum, albuminous exudation, sero-purulent, purulent, or sero-sanguineous fluid and organized adhesions.

PRELIMINARY OBSERVATIONS.—Inflammation of the peritoneum is characterised by the kind of phenomena which are exemplified in the inflammation of the other serous membranes. It may occur at all ages, in every description of temperament, and under the most varied conditions of the system. It attacks the earliest infancy as well as the adult and those in advanced life, and both sexes are equally liable to the affection. It happens to the robust and plethoric, the cachectic and attenuated, and also to those whose constitution has been undermined and broken down; and whenever its distinguishing symptoms are really proclaimed it is one of the most formidable maladies with which the physician has to deal. It may come on suddenly with apparent and easily recognized symptoms, or it may supervene slowly and insidiously, and continue for a time without being detected. It may be primary when it is difficult or absolutely incapable of connexion with any foregoing or coëtaneous disease. It may be consecutive upon, or symptomatic of, some other morbid condition. It may present the sthenic or asthenic form. And it may be met with only in sporadic cases, or prevail as an epidemic. Every example of the complaint will, if carefully studied, exhibit some peculiarity—some cognizable difference in its physiognomy, if such term may be employed—dependent upon the degree of mal-nutrition, or the metamorphosis of the tissues, upon the operation of external agencies, the time of life, the amount of vital power, and the idiosyncrasies of the patient. It will be modified by the state of the depurative organs, and especially by that of the kidneys, because those deleterious and effete matters which ought to be carried off by the renal organs, when retained in the circulation, are particularly prone to institute the inflammatory process in serous membranes. When the disease is regarded in all its phases and its cardinal signs are duly observed, it exhibits a train of phene-

mena peculiar to its own morbid action; and Peritonitis, like pneumonia and certain other diseases, which formerly had always accorded to them an essentiality, is not to be deemed an essential complaint—a nosological entity, as some modern pathologists maintain.

The older authors did not distinguish the inflammation of this membrane as apart and disconnected, but only as associated and confounded with the inflamed condition of subjacent organs and tissues, nor was it until the close of the last century that this distinction was made. Since that time the researches of Broussais, Bichat, Barron, Hodgkin, and more recently of Habershon, have extended our information, and given much precision to our knowledge on the subject. Sauvages remarks:—*Enteritis mesenterica* (Peritonitis) *difficillime distinguitur ab enteritide, quacum etiam saepe complicatur*.* Cullen says it is difficult to say by what symptoms it can be recognised, and more recent authors have expressed themselves in similar language; but, as will hereafter be shown, it unquestionably displays features by which it can be diagnosticated. John Hunter thus delivers himself on this subject:—"If the peritoneum which lines the cavity of the abdomen inflames, its inflammation does not affect the parietes of the abdomen; or if the peritoneum covering any of the viscera is inflamed, it does not affect the viscera. Thus the peritoneum shall be universally inflamed, as in puerperal fever, yet the parietes of the abdomen and the proper coats of the intestines shall not be affected."† That these propositions are sometimes verified it cannot be denied, but according to my own experience in Peritonitis which has existed for a time, it well-nigh always happens that some of the organs and structures which it covers reveal the inflammatory products. Habershon, in a valuable article on the etiology and treatment of Peritonitis, speaks with much boldness and decision on this question, and he bases his conclusions on the trustworthy grounds of accumulated facts. "In 3,752 inspections recorded at Guy's Hospital," says this physician, "during twenty-five years 500 instances of Peritonitis occur, but we cannot find a single case thoroughly detailed where the disease could be correctly regarded as existing solely in the peritoneal serous membrane." He then divides them, firstly, into Peritonitis by extension from diseased viscera or direct injury; secondly, into those connected with blood changes, as in albuminuria, pyæmia, puerperal fever, and erysipelas; and thirdly, into those caused by nutritive change, as in struma and cancer. This author then contemplates the affection, so-called peritonitis, as nothing more than the local evidence of antecedent morbid changes pervading the whole system. Sieveking says it is the climax of nutritive derangements, certainly not to be sought for primarily, in the serous investment of the intestines. The former of these authorities denies that it is *ever* idiopathic, but he would almost seem to discard that term from pathological

* Classis III., gen. xv., sp. iv.

† "On the Blood," p. 244.

phraseology, as he conceives it can hardly with correctness be applied to any disease spontaneously instituted within the organism, and not dependent upon external noxious agencies or parasites.

Sometimes the lesion is but partial, in other instances it extends over the entire membrane, and doubtless it is at the outset only that it is limited, and that its diffusion gradually supervenes. Its closest analogies are pleuritis and pericarditis, and like these affections it is broadly distinguished by its tendency to effusion, adhesions by coagulable lymph, or the deposition of purulent or sero-purulent fluid. The pathologic conditions consequent upon peritonitis, as of the other maladies now instanced, are sometimes inceptive of further disease, or they may be defensive against worst results; they may eventuate in the union or binding down of organs and parts whereby their functions are seriously or even fatally interfered with; or this same tendency to albuminous exudation may, as in some instances of perforation, be conservative of life, the plastic deposit being the means whereby nature essays to effect reparation. But these and kindred considerations will be more fully considered when I speak of the pathology and morbid anatomy of the disease.

ETIOLOGY.—The causes of peritonitis are often traceable to wet and cold, damp feet, damp beds, chill winds, sudden alternations of temperature, as when, after being in a heated atmosphere, the body is rapidly cooled, or to excessive fatigue—in fact to such general influences as are concerned in the production of inflammation in other viscera. It may, in a more direct manner, be induced—in a mechanical way—by invagination, strangulated hernia, surgical operations (as in paracentesis abdominis, and ovariectomy); by contusions, bruises, the wounds of cutting or blunt instruments; by displacement of some of the internal organs, or some unusual stretching or laceration of the membrane;—by the extrusion of certain matters into the serous sac, as in hepatic or splenic abscess, rupture of the stomach, bile-ducts, spleen, uterus, urinary bladder, ureters, the ovary, or some part of the sub-diaphragmatic digestive tube. It may follow or be associated with the acute disease of some organ by contiguity of structure, as in gastritis, hepatitis, splenitis, in dysentery, or in typhoid fever when the lower third of the ileum or the vermiform appendix is ulcerated. Sometimes tumours, extra-uterine conceptions, or malignant growths by the induction of pressure, or ulcerative absorption, give rise to it. The abrupt suppression of habitual discharges, more especially of the catamenia and lochia, and the sudden retrocession of cutaneous eruptions, have been enumerated; and contamination of the blood itself, resulting from the altered and imperfect action of certain of the excreting organs, enters, there are good grounds for believing, far more frequently and far more importantly as an element in the causation than has hitherto been supposed. Indeed, many attacks which we regard as idiopathic are dependent upon a common cause in the organism, but this membrane may sometimes have a greater proclivity to the condition of inflammation than any other part. Some-

times peritonitis is metastatic of rheumatism, erysipelas, and the exanthematous fevers. Broussais repeatedly knew it succeed intermittent fever, and it is occasionally connected with fevers of a malignant type.

SYMPTOMATOLOGY.—The invasion is often sudden, but the attack may come on slowly and covertly. In the acute sthenic form there are generally rigors, followed by heat and flushings, a feeling of lassitude, aching of the limbs, head, or back, a sense of constriction and uneasiness at the epigastrium, thirst, nausea, and acute pains at some, especially the lower, part of the belly. Pressure on the abdomen, coughing, sneezing, the evacuation of the bladder or bowels, or even the erect position, augments the pain; indeed whatever produces weight upon or stretches the membrane, of necessity aggravates the suffering. The pain is at first localized, but it soon becomes diffused over the entire abdomen, and is a prominent sign. As the disease progresses, the pulse becomes quick, hard, sharp, and tense, and rises from 120 to 130 in the minute. In some exceptional cases it does not ascend to more than 80 or 90, and is of tolerably full volume; but as the rule it is firm, small, and cordy. The pulse is not always, however, a sure guide, as most serious attacks may be progressing under all conditions of the arterial circulation; and even pain on pressure, the most trustworthy of all individual symptoms, is not invariably to be relied upon, because it is not uniformly commensurate with the amount of lesion which really obtains. The tongue is mostly moist and covered with a whitish creamy mucus, but occasionally it is dry. The bowels have a tendency to be confined, and the urine is scanty and high-coloured. The skin is hot and dry at the earlier period of the disease, and becomes cool and bedewed with a clammy sweat before dissolution. The patient lies in the supine posture with knees drawn up, and cannot turn on either side without increase of pain. He will say that he experiences a feeling of heat, pricking, cutting, or soreness in his inside; involuntarily he relaxes the abdominal muscles, and sometimes fomentations, and even the weight of the bed-clothes, cannot be borne. The breathing becomes quick, shallow, and almost entirely thoracic, and instead of being 18 or 20 it may be 50 or even 60 in the minute. The downward pressure of the diaphragm is instinctively as much as possible avoided, because it moves the abdominal organs, and all movement gives pain. The passage of flatus along the bowels is followed by the same effect. With regard to the pain, which is a cardinal sign, it presents some differences; sometimes it is permanent, in other cases it is paroxysmal, assuming a spasmodic character, and in a few rare examples it is not present in marked degree. As the rule, it is the chief and most reliable symptom.

A very illustrative example, which came under my care, may here be given, showing how contusions may be followed by fatal peritonitis. A man in middle life was working at a saw-mill. A log of wood fell on the wrong side of the circular saw, which now

“kicked,” and the log was thrown violently against his abdomen, and chiefly hit him at the umbilical region. In the evening he was conveyed to the Tunbridge Wells Hospital on a timber tug, the motion of which shook him much and caused him great pain. On admission there was much pain on pressure at the umbilicus. The pulse was eighty. He was ordered hot fomentations and to have full opiates. He vomited once before he came into the hospital, and once after being admitted. The matters ejected from the stomach were yellow and smelt sour. He passed urine normally. He had a fairly comfortable night, and had taken a mixture with the carbonate of ammonia and camphor. He was ordered port-wine and beef-tea. He went on without much change until about five in the afternoon, when the pulse rapidly failed, he showed the conditions of collapse, and died at half-past seven, about thirty-two hours after the accident. On inspection the bowels were generally red and vascular, and all matted together with the recent lymph, and numerous flocculi were floating in the serous fluid. This case supplies a very illustrative example of the origin, progress, and termination of a flagrant inflammation set up in the peritoneum in a healthy man. There was no evidence of rupture of the bowels, but the violence of the blow at once instituted acute and diffuse disease. The inflammatory products had been quickly and in great abundance thrown out, and he soon succumbed under the general shock given to his system.

There is always between this disease and the features great sympathy. The face becomes pale, the cheeks collapse, and the eyes seem set and sunken in their foramina. It assumes the *Facies Hippocratica*, or what the French term the *Facies Grippée*. Nausea and vomiting often come on with the other symptoms, the ejected matters being a mucoid, biliary fluid; or, in the case of obstructed bowels, the vomited matters may be stercoraceous. Tympanitis is never absent, and often very distressing. The loss of tone in the muscular coat, and the irritation which is conferred on the mucous surface of the alimentary canal, account for such condition. The distension varies in degree. In those whose bodies are flabby and resistless it is often excessive, whilst in the robust and muscular it is in less amount. If the diaphragmatic covering becomes inflamed, singultus often occurs; when the serous coat of the stomach is involved, sickness is urgent; if that of the urinary bladder, there is strangury; and the inflamed tunic of the kidneys will produce ischuria renalis. Percussion elicits the loud tympanitic note, especially in the umbilical and epigastric regions. When there is effusion of serum—which, of course, gravitates to the lower parts—the line of dulness can be most distinctly observed, and it is in some measure altered according to the position of the body. Palpation can only be had recourse to with great care, as the extreme tenderness and muscular resistance prevent much manual examination. When effusion has taken place, and coagulable lymph has matted the intestines together and formed roughened deposits on the liver, spleen,

or some tumour, and when albuminous concretions adhere to the parietal peritoneum, the flat hand laid on the abdomen feels a peculiar thrill or vibration, which is most distinct during inspiration. This sign only obtains when the lymph is thrown out on a resisting basis. Auscultation discovers a creaking friction sound, which is variable in character and intensity, and can only be present for a short time, as of course, on the advent of adhesion, nothing can be heard. The physical signs of pericarditis and pleuritis are far more common. Death is ushered in by quick and thready pulse, cold and clammy surface, loss of heat in the feet and legs, accelerated and laboured breathing and general declension of power, the mind being often clear and collected to the last. Pemberton says the patient frequently expires on the sixth, seventh, or eighth day. But it is equally true that the fatal issue often occurs in two or three days. In puerperal Peritonitis the average duration of the disease has been shown to be about thirty hours, and sometimes, as in perforation, it may be even less than ten hours. When the affection assumes a more chronic form, the patient may live so long as thirty or forty days.

The asthenic type of peritonitis occurs in the cachectic, and those whose vital powers have been undermined by some previous disease. It is that form which is seen as metastatic of erysipelas and rheumatism, and in connexion with the exanthems, malignant fevers, puerperal women, and when there is perforation of some part of the digestive tube. It proclaims contamination of the blood and want of vital power. The effusion is sudden, large in quantity, of debased character, and notably deficient in organizable plasma. The pulse is soft and feeble, the surface soon becomes moist, and all the phenomena proclaim declension of vitality.

When the disease terminates by *resolution*, a gradual improvement of all the symptoms becomes observable. The symptomatic fever declines, the pain is less urgent, and pressure can be borne on the abdomen; the skin is moderately moist, but not below the ordinary temperature; the tongue looks cleaner; the pulse is slower, fuller, and softer; the respiration is more normal, being less frequent and not so thoracic; the alvine evacuations are freer and more natural; and there is generally a copious secretion of urine, which contains an abundance of lateritious deposits. Sometimes moderate diarrhoea or diaphoresis are critical discharges. The sickness and vomiting cease, the tympanitis and feeling of distension obtain in less degree, and the patient can extend his legs and lie on either side with more freedom and ease. Lastly, the countenance, which had hitherto been so faithful an index of the complaint, looks calmer and more natural, it having lost much of the sunken, collapsed appearance above described.

One of the most frequent results is *effusion*; indeed, the affection cannot assume a well-marked and typical character without one or other of the inflammatory products being thrown out, and these, as to their proportion and quality, are varied in every individual example. In the earlier stage of the attack the effusion is but small, and not

such as in marked manner to increase the size of the abdomen. It gravitates into the pelvis and the iliac fossæ. It can be detected by percussion over the lower parts of the belly, and there are general signs which indicate its presence. When it increases, the pain becomes a less prominent symptom, the pulse is softer, there is a feeling of weight and dragging in the body, chilliness and a diminution of animal heat, the extremities having a tendency to become cool. In such cases as are metastatic of some other complaint, the effusion is much more rapidly generated and the serous proportion is relatively very large. Andral records an illustration which was metastatic of rheumatism, and which ran through its course to a fatal termination in three days, and the autopsy showed an enormous quantity of serum tinted with the colouring matter of the blood, and some floating flocculi and false membranes. When pus is secreted, rigors are a common symptom, with febrile exacerbation in the evening, and the pulse is quicker. It is not, if in any notable quantity, absorbed. It finds an exit either by forming an ulcerated opening into the bowel, which is always fatal, or, which is much more common, it establishes a fistulous passage by way of the psoas muscle, or through some part of the abdominal walls. In this tendency to appear at the surface it seems to obey the law of an ordinary abscess.

Inflammation of the peritoneum rarely ends in *gangrene*, and it is still more rare for any considerable portion of the membrane to become gangrenous. When it has come on, it has generally been at or about the vermiform appendix, or when some part of the bowel has been unduly stretched or strangulated; and, according to Abercrombie, it is invariably accompanied with false membranes. The sudden cessation of pain, singultus, coldness of the surface, thready compressible pulse, general declension of strength, and the Hippocratic countenance, are indicative of this condition.

Sometimes the acute gradually passes into the chronic form, when, as before remarked, the patient does not die until after five or six weeks. He may live even several months. In such cases the effusion may not be absorbed nor yet evacuated, or a fistulous communication may have been produced, and all the conditions of *asthenia* usher in the mortal event. Again, in other examples, the serous fluid will be absorbed, the adhesions become firm and organized, or the sero-purulent or purulent matter be discharged, and slow recovery result.

The phases which the inflammation of this membrane may assume are very varied; and it is only by the study of a large number of examples that the physician can anticipate and comprehend the modes of its progress. Sometimes that cardinal symptom, pain, upon which such emphasis has been laid, only obtains at the outset; and notwithstanding its subsidence, the malady goes on. Occasionally, as in *pleuritis*, there may be little or no pain from first to last, whilst rigors and hectic and wasting pronounce still the seriousness of the case at a time long after that period when

danger is generally thought to have passed away, and a large collection of pus is contained in the cavity; or the acute symptoms may rapidly subside under a properly directed antiphlogistic treatment, and the condition of simple ascites will only appear to be present; again, disease instituted in some of the abdominal organs will greatly modify the affection after it has become chronic. In this state adhesions alter the configuration of the abdomen by large masses of fibrin being deposited together, by the soldering of the intestinal convolutions, the agglomeration of one organ to another, or by the formation of separate collections of matter in distinct septa resembling independent abscesses. It sometimes happens, too, that the belly becomes soft and flabby, and, instead of improvement succeeding this disappearance of the tension, convalescence is slow and protracted. From what has now been said, it is obvious that the chronic condition is far from being uniform in its phenomena, and that the pathological changes may be diverse and multifiform.

VARIETIES.—Broussais and some other authorities speak of the induction of peritonitis by the exudation of blood into the abdominal cavity without solution of continuity in any of the blood-vessels. I have never seen such an instance, and these examples must be extremely rare. Such sparse exceptions are to be associated with the hæmorrhagic diathesis, the predisposing causes being the sanguine temperament and a marked tendency to inflammatory complaints. According to Broussais, the pulse is at first full, but soon becomes soft and compressible, the pain very acute, often intermittent, and coldness of the extremities and convulsions quickly close the scene.* Laennec was one of the first to draw attention to hæmorrhagic exudations of serous membranes, and Rokitansky attributes such tendency to the tubercular cachexia, the diseased condition of the blood resulting from cirrhosis of the liver, the scorbutic constitution, and the dyscrasia of drunkards. The effect of specific poisons, such as induce the various febrile diseases, and that anomalous condition of the blood now spoken of in which its fibrinous constituent is diminished, and its serous part augmented, are to be enumerated in the causation of this hæmorrhagic exudation. When the blood having this origin is discovered in the peritoneal sac, it is in large quantity, very red, and in varying proportions mixed with serum.

There is another description of peritonitis which systematic writers have recorded, and to which the name of *latency* has been given. It has been said to attack those labouring under some other ailment, the feeble and attenuated, the aged, the insane, and such as exhibit a low degree of vitality. Its symptoms at the outset are masked and difficult of recognition, and, when recognised of the asthenic type, the features present those distinguishing traits before insisted upon as being characteristic of this complaint. It is evident that such examples are nothing more nor less than secondary affec-

* Broussais, "Histoire des Phlegmasies ou Inflammations chroniques."

tions like unto pneumonia in albuminuria, pleuro-pneumonia when intercurrent in phthisis, pericarditis in rheumatism, and arachnitis in continued fever.

Non-plastic or Erysipelatous Peritonitis.—This is seen as the sequel or complication of the exanthems, in adynamic fevers, and in puerperal peritonitis. Its essential condition is some hæmic change, and it is characterised by asthenia. It is met with in worn-out and undermined constitutions, in the unhealthy, and in those who have had some other malady. Its supervention is sudden, and it runs its course with great celerity. It does not bear an anti-phlogistic or lowering treatment, and is only benefited by stimulating and sustaining remedies. According to Abercrombie, the symptoms are sometimes slight and insidious, but sometimes very severe; and they are chiefly distinguished by the rapidity with which they run their course, and by a remarkable sinking of the vital powers which occurs from an early period, and often prevents the adoption of any active treatment. A remarkable circumstance in the history of this affection is its connexion with erysipelas, or with other diseases of an erysipelatous character. Illustrative of this form of the complaint he gives the instance of a woman who had erysipelatous inflammation of the throat, who was very suddenly seized with abdominal pain and vomiting, and who gradually sank in forty-eight hours. The necroscopy discovered a large quantity of pus in the peritoneal sac. And he gives other and similar examples. This physician also refers to an epidemic of erysipelatous character which occurred amongst the children in the Merchants' Hospital, Edinburgh. The disease was of mild type. In all the cases there was throat affection, consisting of a raw, red appearance, swelling, and aphthous crusts. Two of the little patients speedily sank, and inspection revealed pus in the abdominal cavity. Abercrombie draws a comparison between this epidemic and one of diphtherite, as it was then named, which appeared two years afterwards, and he believed them to be congeners. The correctness of this opinion later years have confirmed. Between diphtheria and erysipelas there is great resemblance. They are both referrible to general blood change, and, as it has been well remarked, are associated with a large group of maladies which stand in close relation with pyæmia. The kind of peritonitis spoken of occurs with a depressed vitalism, consequent upon toxæmic agents imbibed from without or formed within the organism by its own power of genesis; and the term non-plastic well applies to the ostensible difference which there is between this type, deficient in organizable plasma, and the adhesive form of inflammation.

Perforation of the Peritoneal Membrane.—There is no form of Peritonitis which is so fearful and fatal as that in which there has been positive solution of continuity of the membrane, because this accident generally implies the extrusion of some secretion or fluid or substance into the serous cavity. Several of the older authors mention this occurrence, and some vaguely attribute such openings

to worms—a *possibility*, as we know from Andral's case, in which lumbrici passed into the cavity; but this event is exceedingly rare. There is no doubt that in nearly all these recorded instances the real cause of such perforations was ulcerative destruction, or cadaveric change, which former writers had not recognised with that facility and certitude which distinguish the acquisition of modern pathologists. Perforation may be produced in a great variety of ways,—by penetrating wounds made by sharp or blunt instruments, the crushing effect of accidents, lacerating the solid or hollow viscera, or the parietal peritoneum; corrosive poisons, the giving way of the uterine walls during parturition, the softening of a fibrous tumour attached to the uterus and the contents being extravasated; the bursting of a Graafian vesicle, of a mesenteric gland, of a tubercular deposit, of the urinary or gall-bladder; from calculi, from the evacuation of some collection of purulent matter, as in empyema; burrowing through the diaphragm, in abscess, as before remarked, of the liver, spleen, or kidney, in pelvic abscess, and from other causes. Mr. Hulke recorded an instance of renal abscess bursting into the peritoneal sac, which occurred in an unhealthy-looking maid-servant who was admitted into the Middlesex Hospital for hip disease, and which ended fatally. The inspection discovered puriform serum in the peritoneal cavity, and the peritoneal surfaces were coated with a soft yellow lymph. The right kidney was a mere sacculated pouch, and it was ruptured at its upper end. The more common cause of perforation is ulceration, commencing in the mucous membrane, of some portion of the digestive tube, and penetrating through the muscular and serous coats. It may be referrible to softening of the intestinal wall (*ramollissement gélatiniforme*), or to cancerous disease, especially when the cancerous deposit encroaches upon, or absolutely blocks up, the passage. When the accident is from this cause, it is mostly observed in the stomach, colon, or cæcum.

The symptoms are sudden, often violent. Frequently the patient at once falls into collapse. Andral says, that sudden increase of prostration and rapid change of the features are sometimes the only symptoms denoting the accident of perforation. Sometimes there is febrile excitement, as evinced by increased heat of surface, hard pulse, and urgent thirst. In the great majority of cases remedies seem inoperative; the disease rapidly becomes diffused over the surface of the sac; whilst vomiting, dorsal decubitus, quick and feeble pulse, loss of animal heat, and sunken and collapsed features, too truly indicate the powerful impress which has been made upon the circulatory and nervous systems, the mental faculties, generally, remaining unaffected to the last. In those very exceptional cases in which recovery does take place the vomiting begins to subside, the distension to decline; the pulse becomes softer, fuller, and slower; the face is less haggard, the patient sleeps more tranquilly, and the temperature of the body is more natural.

When the stomach is the seat of perforation, as it sometimes is, by simple or specific ulcer, the phenomena are precisely those which obtain when any other part of the sub-diaphragmatic tube gives way. Ulceration of this organ is most frequent in females. Brinton found that in 654 cases 440 were in females, and 214 in males. He also says that in the former sex one-half occurred between the ages of 14 and 20. It happens to children. Lee knew perforation of the stomach of a girl of eight, and in that of a boy of nine years of age. The opening is most frequent at the splenic end, and that part is also most prone to gelatiniform softening. It may give rise to hæmorrhage. Habershon gives an example in which the splenic and pancreatic arteries were opened. It does not absolutely follow that death shall always eventuate, because adhesion may take place between the point of ulceration and the abdominal walls, or one of the solid viscera, or a communication may be established between the stomach and the colon, or the duodenum, or a gastric fistula may be formed externally, or through the diaphragm into the thorax. The last two named are very uncommon, but possible contingencies. Abercrombie gives an example of the kind of Peritonitis now considered. A young woman had been affected with dyspeptic symptoms and epigastric pain for some months. She was heard to scream violently, and when approached was unable to express her feelings except by violently pressing her hand against the pit of the stomach. The abdomen became tender and distended, and she continued in extreme suffering, when she died, twenty-nine hours after the attack. On the inspection of the body the cavity of the peritoneum was distended with air, and likewise contained upwards of eight pounds of fluid of whitish colour and fœtid smell. There was slight but extensive inflammatory deposition on the surface of the intestines, producing adhesion to each other, and to the parietes of the abdomen. In the small curvature of the stomach was a perforation which admitted the point of the little finger. This author gives another case in the person of an elderly gentleman, who was suddenly seized with excruciating pain at the stomach, accompanied by vomiting, coldness, and quick pulse. The abdomen became tense and tender, and he sank in thirty hours. Necroscopy exhibited near to the pyloric opening an ulcerated hole larger than a shilling, to which the liver formed a base, and a little below the perforation of the calibre of a quill through which the contents of the stomach had escaped and caused fatal peritonitis.

The duodenum is less liable to this accident than the stomach; but its serous tunic does sometimes give way under the ulcerative process. Curling was the first to observe that the glands of Brunner are apt to pass into ulceration during the progress of severe burns, and from this cause Peritonitis may in a secondary manner result. In twenty-two autopsies made by Louis in enteric fever, in only two cases was the villous surface of the duodenum found ulcerated. In fifteen examples of that disease examined by Jenner, and in twenty

by Murchison, no morbid condition was detected in this organ. Its ulceration in all its characteristics and consequences very nearly resembled that described of the stomach. Habershon says several cases have come under his observation, the early symptoms of the ulceration being slight until fatal peritonitis had been set up by perforation. In other instances violent vomiting produced the accident. Hodgkin relates the instance of a young woman, aged twenty-four, who was admitted into Guy's with urgent vomiting, small and feeble pulse, and who shortly after died of fatal peritonitis caused by a small ulcer in the duodenum. Habershon gives an interesting example in a young woman, aged eighteen, admitted into Guy's. At first the prominent symptom was vomiting; after a time diarrhoea came on, and the emaciation increased. Examination of the body showed behind the first portion of the duodenum and close to the pancreas a collection of offensive pus, and a perforation a quarter of an inch in diameter was discovered. From the histories of six cases recorded by Clark, he concludes that the event is sudden, after food, and that the pain never leaves its place of origin. In the examples given by this physician there was no sensation of something having given way, nor of heat diffusing itself over the belly. This organ is more frequently perforated by secondary than primary disease. The malignancy of neighbouring viscera is sometimes extended to its parietes, as in cancer of the stomach, liver, spleen, pancreas, and lymphatic glands, and its consequent rupture is followed by peritonitis, which ends fatally.

With regard to the jejunum it is rarely found morbid, and assuredly no part of the digestive tube possesses such an immunity from disease. I have known no instance of its perforation. Neumann and Hufeland, however, have recorded an example of this event.

Perforation more frequently occurs in the lower third of the ileum, and near to the ileo-cæcal valve, than in any other part of the intestines. Of ten cases by Louis, it was within a foot of the valve. Of ten cases given by Stokes, in nine it was within twelve inches of the valve, and one was in the cæcum. Of eleven by Murchison, nine were within twelve, and two within eighteen inches of the same place. Bartlett saw it forty-four, and Bristowe seventy-two inches from the same place. The parts next in order of prevalence are the cæcum and vermiform appendix. Louis was one of the earliest observers of the facts now noticed. It has long been broadly and familiarly known that the agminate glands which are proper to the ileum, and the solitary glands which are scattered throughout the villous coat of the digestive tube, are in enteric fever very prone to take on the ulcerative condition, more especially the patches of Peyer, and occasionally it happens that after the mucous and muscular coats have been destroyed, the peritoneum gives way. These glands are not in like manner predisposed to disease in the course of any other acute affection. The vermiform appendix has in repetition been found the seat of fatal peritonitis, not only in enteric fever, when

sometimes only a very minute orifice can be discovered, but from the impaction of some foreign body, as the seed of fruit, a kernel, a piece of bone, a piece of indurated fæcal matter, or even the single bristle of a tooth-brush.

An illustrative example of perforation of the appendix lately came under my observation, and which may here be aptly cited. A married woman, aged thirty-five, was admitted into the Tunbridge Wells Hospital under my care, and on a cursory examination it was obvious that she was labouring under acute peritonitis. She was well formed and muscular. It was reported that she was taken ill three days previously with severe pain in the abdomen. On the following morning the pain had not diminished. She had walked nearly four miles to consult a surgeon. This exertion increased her malady and augmented her suffering. Vomiting then came on, and she was obliged to keep in bed until brought into the institution. On more careful examination there was great tenderness on moderate pressure over the right iliac and hypogastric regions. After her admission she had diarrhoea for the first three or four days, the bowels being moved five or six times during the twenty-four hours. The opium which she had, arrested this symptom. The pain and tenderness, and the vomiting which she had experienced, became less, and she expressed herself as being much better. During her stay in the hospital her temperature was generally under or over a hundred. At the end of five days after coming into the institution the pain and vomiting (which was never fæcal) returned with great severity, and the tympanitis continued in marked degree. The temperature suddenly lowered, she was sunken in the features, there were all the conditions of fatal collapse, and she quickly sank.

When the inspection was made the body was very tumid. On opening the abdomen the peritoneal cavity was full of fluid, and the intestines and omentum were matted together with bands and irregularly formed masses of lymph. The bowels were injected, and the general pathologic appearance was very typical of acute inflammation of the peritoneum. The vermiform appendix was found ulcerated, and in the centre of the ulcerated patch there was a round, clearly defined opening, which would have admitted a swan-shot. This was near its apex. Just below the perforation was discovered a biliary concretion of configuration somewhat conical, being about four lines in length and two lines on the base.

Of eight cases of perforation given by Louis, seven were in the young and vigorous, and it may here be observed that more recent writers, as Jenner, Murchison, and Bristowe, have shown that it chiefly occurs between the ages of fifteen and twenty. Of the eight cases by Louis, with a single exception, the disease commenced with continued fever, nor did the febrile phenomena assume any severity of character until the advent of the perforation. In four there had been diarrhoea, but only in one were the bowels much

harassed. Tweedie says the state of the bowels, either as to the presence or absence of diarrhœa, is not to be depended upon, as it sometimes happens that the evacuations are healthy when the bowel gives way. Three were quite convalescent when the opening occurred, and a fourth appeared to have fully recovered from an attack of enteritis.

Since Louis wrote his account, much information has been accumulated on this particular subject. It is now well known to all who have made the various forms of fever a special study, that there is no precise correlation between the gravity of febrile symptoms and the occurrence of perforation. The diarrhœa may have been a distressing and persistent symptom, and yet the points of ulceration may not have been either numerous or deep; on the other hand, in cases regarded as mild forms of fever the bowel may very unexpectedly burst, and this event is generally at a later date of the attack, or during convalescence. Tweedie has known it take place when the patient has so far recovered as to leave the house. Murchison published an apt illustration. Some time ago I had under my care a girl in enteric fever who became quite convalescent, and at the end of six weeks, after eating a hearty meal of solid food, Peritonitis supervened, and she died in twenty-two hours. Peacock saw it come on so soon as the eighth, and Murchison on the ninth day of fever. Louis noticed it so late as the forty-second, and Jenner on the forty-sixth day. Of thirty-two cases given by Murchison, perforation occurred during the second week in eight cases; during the third week in six, during the fourth week in nine, and after the fourth week in nine. Louis says, if in acute disease, and in an unexpected manner, a violent pain in the abdomen supervenes; if this pain is exasperated by pressure accompanied by rapid alteration of the features, and more or less promptly followed by nausea and vomiting, we may believe and announce that there is perforation of the intestine. Pain is not a symptom in all cases continuous up to death. It sometimes notably abates, and in exceptional examples ceases entirely for several hours before dissolution. Jenner saw a patient in whom there was no pain at all, vomiting and cold extremities being the only symptoms. Tweedie asserts that the symptoms of this event are not uniformly well pronounced. The accident may be masked by delirium so considerably that the time of perforation and its absolute occurrence may be uncertain.

Stokes gives particulars relative to nine cases which occurred under his own observation. These happened during fever; one in catarrhal fever, two after acute enteritis, and in one case hypercatharsis produced by an overdose of salts was the cause. In several of these nine instances there had been diarrhœa. He also comments upon a fact worthy of notice, that in three were produced irritation of the bladder and inability to pass urine. In all, inspection revealed ulceration of the muciparous glands; and respecting the time which the patient lived after the initiatory symptoms of perforation, it varied

from twelve to one hundred and twenty hours. Stokes also says that the average duration, deduced from nineteen cases which he had collected from various sources, was twenty-nine hours. Louis' patients lived from twenty to twenty-four hours. Murchison has known death follow in four hours, and not until one hundred and five hours. I have known it from seven to twenty-three hours. The period subsequent to the accident must needs be influenced by a variety of circumstances, such as the character of the antecedent or coetaneous disease, the vital powers of the patient, the extent of the orifice, and the kind and quantity of lymph thrown out, the part of the bowel, and the conditions favouring or opposing adhesion. If in a fever of the adynamic type, when the powers of the system are much reduced, the shock may be such as at once to usher in a fatal collapse. If the opening be in immediate apposition with another coil of the bowel, a solid organ, or the walls of the abdomen, the extrusion of the contents of the canal may for a time be arrested. Bristowe relates a case in which the patient lived fourteen days after perforation. I remember an instance in enteric fever in which there was a hole that would have admitted a swan-shot on the lower part of the ileum, but depositions of pearly lymph had so effectually sealed up the opening that none of the intestinal contents had escaped. When, however, they do escape, the inflammation becomes so intense that remedies are generally powerless. Chomel, Louis, Rokitansky, and Jenner say it is *always* fatal. Tweedie, Todd, Ballard, Fox, Bell, and Murchison aver that they have known recovery. The last-named relates the instance of a girl of sixteen, who, on the thirty-first day of fever, was suddenly seized with severe pain and tension of the abdomen, urgent vomiting, and all the symptoms of collapse. A grain of opium was given every second hour, and during the first thirty-six hours ten grains were taken. The patient made a tedious recovery, and was discharged from the hospital fifty-five days after the commencement of the peritonitis.

In some exceptional examples, the more formidable symptoms will apparently subside, and life be preserved for even several days. This deceptive kind of amendment should not, however, throw the physician off his guard; he should not forget those grave and alarming indications which pronounced the existence of the accident, as it almost invariably proves that the mortal end has only been deferred, not averted. In the case observed by myself, if there was no absolute escape of the intestinal contents, the soft lymphic plug could not for any great length of time have sufficed to act as a barrier to extravasation. Some slight strain, as in the evacuation of the bowels, coughing, sneezing, or the mere motion of the body, might doubtless have been sufficient to remove the non-organized albuminous deposit, and render the opening free. Notwithstanding the well-nigh hopelessness of all cases in which there is positive solution of continuity, it is from pathological reasoning a possibility that recovery may succeed. Nature attempts to repair the lesion

by throwing out plastic materials, and if these,—by utter rest, and by opiates subduing the peristaltic action of the bowels,—be allowed to lie in contact with the breach sufficiently long to become permeated with new vessels—to be organized—the orifice may be repaired: such reparation, however, can only be effected when the hole is small, and then it is but a mere possibility.

Though the first symptoms of perforation are nearly always distinct and terrible, in exceptional cases they may be ill-defined and obscure; or they may gradually assume increased severity. They will be influenced by the size of the aperture; for instance, the solution of continuity, when it takes place in the appendix, is sometimes very minute, and the escape of irritant matters inconsiderable. The orifice may at first be small and by degrees enlarge, and relatively with the enlargement (and consequent greater extravasation of liquid and faecal contents) will increase the irritation conferred to the sac and the more manifest phenomena of inflammation. Confirmative of these assertions, Dr. John Harley may be cited. In some cases, says this physician, the perforation has taken place so gradually, the aperture formed is so small, and the extravasation so inconsiderable, that the symptoms of peritonitis come on and attain their maximum very gradually, and without any sudden increase in the severity of the symptoms.

The colon is occasionally perforated in fever, but it is much less prone to this result than the parts last named. Chomel, Brinton, Forget, and Murchison mention five instances. In two out of these cases the opening was at the junction of the transverse and descending colon; and in the three others at the junction of the sigmoid flexure with the rectum. The last-named authority lately gave a good example of the giving way of the large intestine. A young man of eighteen was admitted into the Fever Hospital; he had been ill fourteen days, and on admission was very ill of typhoid fever with Peritonitis. The pulse was quick and feeble, the body enormously distended and tender, the motions frequent and watery, and the breathing thoracic. He died at the end of fifteen days after admission. Inspection discovered the entire surface of the peritoneum to be coated with a thin layer of lymph which could be stripped off with a knife. There were three perforations in the large intestine, one about three and a half inches below the valve, and two in the sigmoid flexure. There were no contents of the bowel in the serous sac.

With respect to the average of perforation in fever, Murchison states that out of 435 autopsies recorded by Bretonneau, Chomel, Montault, Forget, Waters, Jenner, Bristowe, and those made at the London Fever Hospital, it occurred in 60 cases, or in 13·8 per cent. It probably happens in about three per cent. of those who have enteric fever, and more frequently amongst males than females.

In chronic dysentery, sometimes, after ulceration has destroyed the mucous and muscular coats, the peritoneum is penetrated. In

such instances the special and general symptoms, which characterise the primary disease, point to a correct diagnosis. In cancer of the bowels perforation may occur: it is more frequent in the large than small intestines, and Rokitsansky says the colon is almost exclusively the seat of cancerous degeneration. I saw in consultation some time ago a gentleman labouring under diffuse peritonitis, which had evidently been caused by a large hard tumour, the size of a cricket-ball, in the left hypogastric region. The stools were flattened, but the passage was evidently quite patulous. I gave it as my opinion that it was a case of cancer of the large bowel. A surgeon was at this juncture called in, and he strangely enough proposed Amussat's operation merely to give exit to the flatus, when large pieces of fecal matter were voided, but fortunately that suggestion was overruled by two of the most eminent members of the profession. In the course of a few days the patient died. Perforation was announced by a sudden and terrible increase of pain, small pulse, sunken features, and cold extremities. The autopsy revealed abundant proofs of foregoing and present peritonitis. There were several pints of serum in the abdomen, which contained loose flocculi; the descending colon was adherent to the abdominal walls, and a little above the sigmoid flexure was a cleanly cut, punched hole, the size of a small pea, through which a large quantity of thin feculent matter had passed into the peritoneal sac. The upper third of the rectum, and the opening into the sigmoid flexure, were the seats of cancerous deposit, and the canal was patulous.

Habershon divides perforations into two great classes, those which arise from disease commencing in the intestine itself, as by the ulceration of fever, dysentery, cancer, and the various forms of insuperable constipation; and those in which perforation is from without, as in strumous peritonitis, ulceration of the stomach extending to the transverse colon, hydatids, and abscess of the liver, calculi, abscess in the other solid viscera or abdominal walls, cancer, extra-uterine foetation, and external injuries. It may be caused by laceration of the gall-bladder. Barthez and Rilliet mention a case in a girl of twelve whilst in fever, and Murchison gives another instance in a young man of nineteen, who was suddenly seized with peritonitis on the fifteenth day of the fever, and who died in twenty-six hours. It is rarely observed as the result of tubercle. Sir Thomas Watson, in his large experience, only remembers a single instance. Of fifty-six cases collected by Habershon, four only were from strumous disease. Jenner once knew a softened mesenteric gland give way during fever, and Buchanan saw a fatal case of Peritonitis from the bursting of a softened embolic deposit in the spleen of a typhous patient.

Puerperal Peritonitis.—In the discussion of this part of the subject I may here observe that it is not my purpose to enter upon the consideration of puerperal peritonitis as it occurs epidemically; but as I believe with many other writers that puerperal women are

liable to a simple form of peritonitis, its description necessarily comes within the limit of this article. Sporadic cases from time to time occur without the diffusion of the disease, but even then it is right to observe the utmost caution, as so much doubt is always involved with regard to its contagious nature. Inflammation of the serous covering of the uterus and its appendages may, I believe, supervene as an incidental circumstance, without the superaddition of a specific poison. The great effort of the organism, the irritable condition of the body, after the exhaustion of expulsive endeavours, the long distension of the uterus and the abdominal walls, and their sudden contraction; the friction of opposed surfaces in the abdomen during labour, and the great excitation given to the circulatory and nervous systems, may produce peritonitis. Other causes operate in the production of this result, such as injuries inflicted during instrumental delivery, in turning, adhesion of the placenta, the use of cold affusions in flooding, and the improper administration of stimulants. Contamination of the blood, originating in the body itself, without reference to external agencies, as when absorption takes place from putrid coagula or a piece of retained placenta, is another mode by which the malady is originated. In uræmic poisoning, as before remarked, the serous membranes are predisposed to inflammation, and the blood vitiation during parturition resembles this cause.

There is, I need scarcely say, still much conflict of opinion relative to the real nature of abdominal inflammation after child-birth. By some it is yet maintained that Peritonitis and puerperal fever are identical—that these terms express but one affection. It is true that in a large proportion of those who die of puerperal fever the peritoneum is inflamed, but this membrane is not *always* involved; and although this form of inflammation accompanies this disease far more frequently than any other form, yet puerperal fever is something still more. Of 222 autopsies of puerperal fever, given by Tonnelli, in 193 were traces of Peritonitis; in 29, or one-eighth, there were no traces whatever. Of 44 cases examined by Lee, the peritoneum and uterine appendages were inflamed in 32, or in the relative proportion of 8 cases out of every 11. Bartsch, in a report of the Midwifery Institution at Vienna, records the morbid appearances of 109 cases of those who died of puerperal fever, and in this report puerperal fever is distinguished from Peritonitis and metritis. The cases of puerperal fever, he says, occurred *seldom under the form of puerperal Peritonitis*, but generally as inflammation of the uterine veins, giving rise to the production of pus in these vessels, and the general symptoms accompanying its absorption. Let any one, says Fleetwood Churchill, compare a case of simple inflammation of the womb or peritoneum in child-bed with a case of epidemic puerperal fever, their symptoms, course, and the effect of remedies, and I do not think a doubt will remain upon his mind, that although the latter is a local disease, it is not exclusively so.

The symptoms common to this form of Peritonitis may come on

in a few hours, a few days, or even so long as two or three weeks after delivery. Pains and rigors are generally the first indications, and pain on pressure is more distinctly felt at the hypogastrium than at any other part. The skin is hot, the cheeks are flushed, the pulse is quick, and the respiration hurried. The pain soon radiates from the hypogastrium into the iliac fossæ, and then to the other parts of the abdomen. It is not always severe, and is sometimes characterised by paroxysmal attacks, the patient being free from suffering during the intervals; nor can it be said that this symptom pain is pathognomonic of puerperal Peritonitis, because post partum uterine pain may be urgent when there is no co-existent inflammation, and there may be inflammation with little or no abdominal pain. Churchill asserts that he has seen five or six cases of intense peritonitis as proved by dissection, in which there was neither pain nor tenderness; and Ferguson records that he has known nineteen cases in which there was no pain.

The abdomen suddenly becomes large, more quickly and to a greater extent than in any other kind of Peritonitis, which may be accounted for by the often relaxed and resistless condition of the muscular system of parturient women, and because the abdominal walls have been so recently distended. At the onset of the attack the uterus can be felt above the pelvic brim, soft, flabby, and uncontracted, but as the distension obtains in greater degree it cannot be distinguished. The lochia are at once diminished or suspended, or their absolute suppression may precede the inflammatory phenomena. If the milk have begun to flow, its secretion is arrested; if it have not begun, it is prevented. If the mammæ have been full and rounded, they fall in and are flaccid and smaller. The pulse varies, but it is always above, in the great majority of cases greatly above, the normal standard. In non-inflammatory, uncomplicated cases, the circulation may be accelerated, for a day or two, or two or three days, but there is a gradual declension of its frequency from the time of delivery. If, however, after delivery the pulse shall have fallen to, or near, its natural number, and it then suddenly begins to rise, accompanied by local pain, higher temperature, thirst and diminished secretions, the cause is often obvious.

After pains may be confounded with those of inflammation. They come on soon after delivery, but decrease in force and frequency as time wears away. Peritonitis does not come on so soon, and its symptoms become more and more proclaimed, instead of diminishing. After-pains are associated with a firmly contracted uterus; Peritonitis with a relaxed uterus. Remedies which relieve the former are useless or harmful to the latter. In the one affection the circulation may be natural; in the other it is never so. At the first the diagnosis is very difficult, because after-pains may be followed by inflammation, and for a time the symptoms be mixed up; but the progress of the case leads to a correct conclusion. When puerperal Peritonitis is accompanied with intestinal irritation and the inflam-

mation has extended to the mucous membrane, sickness and diarrhœa may be urgent. When the malady terminates by resolution, the pain abates, the tympanitis declines, the pulse becomes fuller and slower and softer, the skin cooler and moist, the tongue cleaner, the lochia are re-established, the breasts become rounded and milk begins to flow, the legs can with more comfort be extended, and the patient can lie on her side. The conditions of approaching dissolution are—weak and thready pulse, varying from 120 to 160; the abdomen keeps distended and tender, cold clammy sweats come on, the extremities become cold, the breathing is quick, shallow, and thoracic, she lies on her back with legs drawn up, the features are sunken, and the mind often remains calm and clear to the close.

Perityphlitis.—This particular form of disease has been more fully described by French than British pathologists. MM. Husson and Dance give an excellent account of the affection; and it is also well described by Dupuytren, Menière, and Duplay. Amongst the English authors may be named Copland, Syme, Craigie, Farrall, Burne, Sellar, and West. The disease originates in the tunics of the cæcum, and by some it has been named pericæcal abscess; the glands or follicles of this organ at the first become inflamed and then pass into the ulcerative condition. The ulceration of this part of the large bowel may insidiously destroy the mucous membrane, implicate the submucous cellular tissue and peritoneal coat, and either cause inflammation and lymphic adhesion of the latter, or its fatal perforation. When agglutination occurs the lesion may be arrested. Craigie defines the malady to consist in inflammation and suppuration of the cellular tissue connecting the cæcum to the quadratus lumborum muscle and other parts, or in inflammation and ulceration of the mucous membrane of the cæcum; and Sellar says its pathological seat is in the cellular tissue between the fascia of the iliacus internus and the coats of the cæcum.

The causes of perityphlitis may be referred to the peculiar position of the cæcum, as well as to other circumstances. It is attached to the muscles of the right lumbar region, and its sacculated pouch depends below the ileo-cæcal outlet, and, as all physiological anatomists observe, its contents have to be propelled against gravity; and it thus may become distended with fecal matters, and such irritation be instituted by its distension and pressure as to set up inflammation of the lining membrane. Again, hard and indigestible articles of food, the stones of drupaceous fruits, seeds, pieces of bone, and metallic, porcellaneous, and vitreous fragments have been known to give rise to it. The complaint has in several recorded cases been present long before its nature has been discovered. Its earliest conditions are rendered manifest by the tumescence and dulness on percussion at the right iliac fossa. The circumscribed swelling may extend across to the umbilicus, and when such is the case peritonitis is generally the accompaniment of other pathologic changes. The patient will complain of pain at the upper part of the thigh, and this has not the same

freedom of motion as the other limb. It has repeatedly been found that there has been irregular action of the bowels, associated with colicky pains, which radiate from the iliac region. West says, that in children the bowels are mostly relaxed, and that pain in the stomach is an initiatory symptom; and he also remarks, that the prominence in the right flank sometimes assumes that of an elongated tumour, which reaches from the ramus of the pubis nearly to the hypochondrium, and has a brawny hardness.

When the ailment has for some time subsisted, lymph and purulent matter are deposited in the cellular tissues behind the cæcum, and so long as the strong iliac fascia prevents the escape of pus, a deep and irregular abscess is formed. The secretion at length most frequently passes through the cæcal parietes at the part uncovered by the peritoneum, as recorded by Copland, Duplay, and others. In some instances it is infiltrated into the cellular tissue in front of the iliacus internus, and effects an exit near the anus; or it may pass into the folds of the meso-colon, or make a sinus and be evacuated externally, as in examples related by MM. Husson, Dance, and Menière. Dupuytren knew it extend so high as the right kidney, and so low in the pelvis as to collect between the rectum and bladder. The perityphlic inflammation may be circumscribed and rather of the sub-acute than the acute type, with adhesion of adjacent surfaces. When the matter perforates the serous sac, diffuse and fatal Peritonitis ensues.

Peritonitis of Children.—Acute Peritonitis seldom occurs in infancy and childhood. It has been more frequently observed in young infants than in children several years older. Some have declared it may affect the fœtus; in all such instances syphilis in the mother has been regarded as the cause, nor is it improbable that a general taint in the mother should impart disease to the child. Irritation of the digestive surface is more common in children than inflammation of the serous tunic. When Peritonitis does occur, it is generally as a complication or sequel. It may, however, be primary as well as secondary; it may be partial or general; acute or sub-acute, and then pass into the chronic condition. When it appears it is mostly after one of the exanthematous fevers; more especially after scarlatina or measles. West has not known more than half-a-dozen instances of acute general peritonitis in childhood. It has prevailed among young infants when exposed to deleterious external agencies. According to M. Thore, at the Hospice des Enfants Trouvés, at Paris, 6 per cent. of the infant mortality was from acute peritonitis. It usually came as the complication or sequel of some other ailment, and no child above ten weeks was attacked by it. The fatal end was generally before twenty-four hours. Of sixty-three inspections in no case was there pus, but in all a greater or less amount of serum on which flocculi floated, and the intestinal coils and solid viscera were adherent. In seventeen out of the sixty-three, erysipelas had preceded the peritonitis. Pleuritic effusion was discovered in a third of the examples.

The usual symptoms are pain in the bowels, which at first resembles common stomach-ache. It alternately subsides and returns, and there is mostly diarrhoea. In the course of a few days the pain becomes more fixed, and the child frequently complains of pain in the right side, and if old enough he indicates the locality by putting his hand on the caecal or umbilical region. The pyrexial phenomena are proclaimed, the little patient looks haggard, he is restless and continually alters his position; pressure over the part makes him cry, and the abdominal muscles are tense. He lies on his back, often with legs extended, and the sickness is not so urgent as in the adult. According to West, when the affection is of caecal origin, the right leg is often drawn up and the left extended.

Gregory a long time ago described a form of marasmus, which he believed to be primarily disease of the peritoneum, and which he conceived to differ from what Pemberton terms irritation of the intestines, and the kind of marasmus originating in the mucous membrane. From being met with in scrofulous children, and an imperfect kind of pus being produced, he named it scrofulous inflammation of the peritoneum. He regarded it to be distinguished by abdominal tenderness, shooting pains which at the first come on in paroxysms, but at length increase in frequency and violence. The pain on touch is first localized, and then becomes diffused. Inspection revealed pus and agglutination of the viscera. But the account of this author applies more to chronic than acute peritonitis. In acute peritonitis of children pus is a rare consequence; when it is formed it gravitates into the lower parts of the abdomen, and is deposited in one or more collections or septa. It may be evacuated by pointing externally, as in empyema, or effect an exit by the bowels, and it is possible recovery may follow, but such is a possibility rather than a probability. When it occurs consecutively, as after some fever, and when the powers of vitality are lowered, turbid serum with a few floating flocculi is the common product, as I have already observed when speaking of the non-plastic type of the disease.

Complications.—This affection is often complicated with some other disease. It may be complicated with *gastritis*, a disease which rarely or never occurs in this country as an idiopathic affection, although it is said to do so in warm climates. The physician will, in nearly all cases, discover from the history of the case, or collateral circumstances, the cause of the inflammation. Gastric peritonitis may be fatal without the contents of the stomach being poured into the serous sac, and without solution of continuity, especially when it occurs in a secondary form. But in such examples the inflammation is only limited. Sometimes tumours press upon the organ and inflame its serous covering, or the inflammatory condition may be there instituted by contiguity, as when neighbouring viscera, such as the liver, spleen, and intestines, are thus primarily diseased. Carcinoma, especially of the pyloric end, will sometimes, by the mechanical pressure, give rise to the result in question; when this happens the

peritonitis is generally of the more chronic description. In that form of ulceration of the stomach, which occurs mostly in young women, the general health is often not much affected. It is often in association with chlorosis, amenorrhœa, leucorrhœa, or sub-mammary pain, and the patient is apt to complain of a gnawing sensation at the epigastrium, accompanied with more or less of anorexia and vomiting. When the gastric peritoneum is rent or perforated by ulceration of the inner tunics, the pain is excessive, the powers of life are rapidly subdued, and death is inevitable.

When the peritoneum is inflamed in *Hepatitis* it is generally in a partial manner, and it continues to be circumscribed unless extravasation of some description result, which is occasionally the case, and then the entire sac at once assumes the same morbid condition. Inflammation may begin in the parenchymatous structure and extend to the serous coat, and when such is the fact, the pain becomes more acute and defined, and the pyrexial symptoms are more pronounced. The right hypochondriac region is often full and tense, the normal lines of dulness are extended, there is pain on pressure and deep inspiration, and dyspnœa, coughing, and vomiting are frequent accompaniments. The patient cannot lie on his left side, and the recti muscles are rigid. When the convex surface is affected, the diaphragmatic investment assumes the same disease, and cough is a prominent symptom. The convexity may be inflamed without the appearance of jaundice. When the concavity is inflamed the stomach mostly becomes implicated, sickness is urgent, the gall-ducts are more or less obstructed, and jaundice, in greater or less degree, is a common result. When the parenchyma is alone inflamed, the pain is of a dull, aching character. When the serous tunic is involved, the pain is sharp and acute. When lymph in considerable quantity is effused, the organ becomes adherent to adjacent surfaces, and if the albuminous exudation gravitate to the lower part of the abdomen, agglutination of the intestinal folds occurs. When hepatic abscess points to the surface, partial peritonitis, by pressure, is induced. The effused lymph is protective from the worse consequence of extravasation. Hydatid tumours may, like abscess, excite adhesive inflammation. Cancerous growths occasionally produce sub-acute hepatic peritonitis, but the symptoms are ill-defined and obscure. And the same remarks apply to tubercular masses in the capsule of the liver.

Sometimes we observe *Acute Splenitis* as an intercurrent complaint during the progress of intermittent fever. But, as I have more fully insisted in the article on Diseases of the Spleen, this organ is infinitely more prone to a chronic form of congestion. Sometimes, when during the cold stages the capsule becomes suddenly distended, such tension so stretches the fibrous and serous tunics as to usher in the inflammatory process; then pain of sharp and stabbing character, increased by pressure, is felt beneath the left costal cartilages radiating through to the back; the skin is hot, the pulse quick and hard, the urine high-coloured and scanty, the tongue furred, the

bowels are confined, and if the under surface of the diaphragm has become affected, cough and dyspnoea are associated symptoms. The patient lies partly on his back with trunk curved to relax the abdominal muscles. Towards evening there is exacerbation of the symptoms. Post-mortem examination reveals the serous investment thick and reddened, and the organ united to neighbouring parts by albuminous exudation; and it is here not unworthy of remark, that in the peritoneal inflammation of this viscus, cartilaginous and ossific conversions are more frequent than in the peritoneal inflammation of the other solid abdominal organs.

In *Enteritis*, when all the coats of the bowel are inflamed, the disease may commence in the mucous membrane, at first sickness and purging being urgent. In such cases colicky pains come on at intervals, and moderate pressure produces little or no uneasiness, and at this stage of the malady it is often difficult to form a correct diagnosis. If the complaint make progress, if the skin become hot and dry, the pulse quick, the face flushed, and pain be felt on pressure, it is of great practical importance to distinguish the kind of lesion to which the disease has advanced, because remedies which would relieve the colic would be absolutely injurious in inflammation. Instead of diarrhoea there is often constipation; thus it is when mechanical obstruction of the gut is the cause of its being inflamed, as in intussusception, and when tumours block up the passage, and vomiting of stercoraceous matters proclaims the inverted action of the bowel. The general and special signs of the peritoneum being inflamed are the same as those above described. In *children* the complaint is frequent during dentition, and it sometimes comes on as the sequel in eruptive fevers. Crude and indigestible articles of food in these little patients are often the cause. Its advent is marked by languor and peevishness, the child is restless and complaining, green mucoid stools emitting an offensive odour are voided, the cheeks become flushed, the belly tender, and all the conditions of peritoneal inflammation are superadded to a fever of the remittent type. And dissection sometimes exhibits the entire substance of a portion of the ileum presenting a gangrenous appearance in addition to the ordinary products of serous inflammation.

In *Nephritis*—which is in the great majority of instances brought on by calculus in the pelvis of the kidney, blocking up of the ureter, some irritant drug, or some blow or external injury—severe pain over the loins following the course of the ureter on the same side, and, in the male, retraction of the testicle, high-coloured urine, and nausea and vomiting are common symptoms; and, as is occasionally the case when ischuria renalis supervenes, uræmic symptoms are apt to mask and obscure the otherwise more apparent features of peritoneal complication (*perinephritis*). The urinary bladder may be acutely inflamed (*cystitis*), the inflammation originating in the mucous membrane, and being extended to the muscular and serous coverings. It is caused by calculi, irritant drugs, retention, surgical

operations, and external injuries, and the peritonitis may be partial or general.

Hystitis is very rarely observed in the unimpregnated uterus; it may come on after menorrhagia by sudden suppression of the catamenia, long walks, wet and cold, and I have known it induced by the incautious use of topical applications. It is most frequent after delivery, and the fundus is the part mostly first affected. When the peritoneal investment becomes implicated the disease often assumes an alarming character. *Ovaritis* may be presented in one or both the ovaries without the uterus being inflamed; in the larger number of examples, however, it is the complication of general Peritonitis or antecedent uterine inflammation. Deep-seated pain in one or both of the pelvic cavities indicates the lesion, and when the peritoneum is affected the pain becomes exceedingly acute, and an aching, wearying sensation extends down into the groins and thighs. There is often frequent desire to micturate, and when the disease is continued to the posterior portion of the peritoneum the rectum is rendered irritable, and there is constant inclination to evacuate the bowels. Puffiness or swelling is sometimes seen over the ovarian region, and that part is most painful on the least pressure, and the sickness and vomiting are often distressing.

The comparatively recent establishment of that great surgical operation *ovariotomy*, more especially as practised in this country, has proved that the peritoneal sac can be laid open, and its inner surface exposed over a great extent, and for a considerable time, without the production of such fatal results as it was formerly believed would inevitably follow. It now appears, from a large accumulation of cases, that in a healthy subject, and especially in the unilocular tumour, and when there are no attachments, the peritoneum may be cut, and freely, without the consequent inflammation being always formidable.

There are some other affections with which Peritonitis is occasionally complicated. In pericarditis and pleuro-pneumonia it sometimes happens that the inflammation spreads to the peritoneum: but in such instances it is often extremely probable that a contaminated state of the circulatory fluids constitutes the predisposing cause, and that the irritation existent in one of the great cavities is readily transferred to another, and that an adjacent membrane of similar structure, and under general predisponent circumstances, will take on the same morbid action. And, conversely, we know that Peritonitis often extends to the pleura, and it is not uncommon, as I have lately seen, to find hepatitis associated with dulness, moist crepitation, and all the other physical signs significant of inflammation in the lower third of the right thorax; and when the spleen is greatly enlarged, or in acute splenitis, the same conditions obtain at the base of the left lung; pressure and the proximity of like structures being the cause of such extension. In empyema the diaphragm may be rendered convex towards the abdomen, pushing down the abdominal

organs, and friction and pressure induce peritonitis; and in the enlargement of the liver or spleen, or an encysted kidney, or an ovarian tumour, this partition may be thrust up so abnormally into the chest as to press upon and excite the pleuro-pulmonary tissues to active inflammation.

MORBID ANATOMY.—The morbid appearances of peritonitis are very various, being modified by a number of circumstances; such as the type, the primary or secondary character of the attack, the condition of the blood, the amount and kind of disease in the viscera, and more especially of the solid organs.

Before speaking of inflammatory change, it may be observed that serous membranes may be simply congested, presenting a condition analogous but not amounting to inflammation, and this hyperæmic state may be transient, temporary, or long-continued. When often returning or for some time existent it may give rise to excess of secretion, which is chiefly serous; nevertheless it may contain some coagulable matters, but their amount will be dependent upon the increase or diminution of the fibrinous and albuminous constituents in the blood. Such abnormal afflux of blood in this membrane may subside spontaneously, or there may be hæmorrhage into the sac, and such hæmorrhage may be passive or active,—it may be by transudation or rupture. Exhalation into the peritoneal cavity sometimes occurs, when a sanguinolent serum and an injected membrane are discovered. In visceral laceration considerable collections of blood of course may follow.

The gases generated in the cavity of the peritoneum are sometimes in great amount; they are in nearly all instances the result of cadaveric change and the decomposition of the secretions. In empyema, gases are produced when there is no solution of continuity in the pleura, and the same may result when there is pus in the abdomen and the peritoneum has maintained its integrity; but they may have their origin in ulceration of the intestines, or traumatic injury.

The first inflammatory change in the peritoneum is the loss of transparency and of that shining polished appearance proper to its healthy structure. This dulness or opacity is accompanied by diminution of the lubricating secretion, and Baillie, Bichat, and Knox affirm that the membrane becomes dry. But such dryness is more apparent than real, because when handled it feels moist and unctuous. The sub-serous vessels become injected, and may be seen through the fine membrane in hair-like streaks, arborescent and ramified, or in a confused network, and when much crowded a velvety appearance is imparted. The degree or shade of redness depends upon the period of congestion, the kind of inflammation, and the condition of the blood. When the hyperæmia has for some time continued, or in sthenic inflammation, the hue is light red; when the congestion is but recent, or the inflammation of asthenic type, the colour is less vivid and may be darker and venoid.

With the progress of the disease, vessels in the membrane which were colourless enlarge so as to admit red-blood globules. At various points small sub-serous sanguineous effusions are seen in the shape of bloody puncta; sometimes these are so numerous as to exhibit a spotted or speckled appearance, or they may coalesce and form red configured patches of various sizes. I have said that at the first there is diminution of the lubricating fluid. In the course of a short time (at periods differing according to certain conditions which obtain, such as the mildness or severity of the attack, the general powers of the system, and the like) this secretion is re-established, and if the malady end in resolution it manifests all the characteristics of the natural state; but if the complaint progress it is augmented in quantity and altered in quality. The free surface of the peritoneum is then bathed with a semi-transparent homogeneous fluid, and the sub-peritoneal tissue is surcharged with a sero-albuminous secretion, and frequently the peritoneum proper can be stripped off with undue facility. This infiltration, however, at length permeates the serous tunic, when it and the filamentous layer become so confounded that it is not easy to trace the line of union. Under such circumstances the membrane is not only rendered opaque, but it looks thick and tumefied, and if carefully examined it feels rough, has lost its lubricity, and close inspection detects a viscid albuminous deposit varying in thickness according to the duration and severity of the attack.

The new or morbid secretion which is effused soon separates into two distinct forms,—a thin and watery whey-like fluid, and a thick, gelatinous, pulpy, or more solid portion; the former constituting serum, the latter coagulable lymph, or, as it is otherwise named, albuminous exudation or plasma. The relative proportions of the fluid and more solid parts vary in each individual instance. Sometimes we find no serum whatever, and sometimes the effusion consists almost entirely of serum, the only traces of the albuminous exudate being minute flocculi floating in the fluid and rendering it turbid. In the inflammation of metastasis and low types of Peritonitis the effusion is sometimes puriform, or absolutely purulent. In acute sthenic Peritonitis the lymphic deposit is great. It is thrown down on the free surface of the sac in various amounts according to the condition of the circulation and the violence of the inflammation. It may be a mere film or in a layer several lines in thickness. It differs in colour, being sometimes of greyish red, but is more frequently of a yellowish straw colour. When abundant, it lies in smooth or corrugated plates; it is also found in honeycomb arrangement, in bands or bridles constituting bonds of union of varying thickness uniting the viscera, or it may be encircling the gut; it is generally seen in masses filling up the interspaces, and when lying between the intestinal folds it assumes an ill-defined prismatic configuration. The viscera are not only glued and matted together, but there is mostly more or less of adhesion to the parietal

peritoneum. When a portion of the adventitious stratum is detached from the peritoneum, the coherent surface of the new product exhibits an irregular villous character, and it is speckled with small bloody puncta produced by torn capillaries, and the sub-serous tissue is ecchymosed. The new formation being at first villous, becomes smooth and more dense, and at length assumes a structure and qualities analogous to the true peritoneum.

If the exudation be submitted to the microscope new vessels are seen to permeate its substance, and more especially in the central portions. That they are connexions or prolongations of the peritoneal capillaries is beyond dispute, although we cannot always trace their continuous structure. It was believed by Hodgkin that new vascular extensions are carried out into the exudation, and that subsequently towards the peritoneum they contract and become nearly or quite invisible. This author is of opinion that the delicate parietes of the extreme vessels give way, that minute quantities of blood are received into the exudation, and that such are the first beginnings of those minute cavities which are destined to become vascular.

It is quite evident that the plastic effusion is an irritant to the serous surface, because when deposited on one part of the peritoneum, and any other opposing part comes in contact with it, such readily takes on the inflamed condition; hence it becomes explicable, in one way at least, why peritonitis is so liable to diffusion. According to the time which elapses after its production, and the vital powers of the organism, is the degree or completeness of the organization. From being a semi-fluid gelatinous substance it becomes more dense and solidified, the capillaries are more numerous, it contracts in bulk, its filamentous texture is more defined, and it enters into firmer and more intimate union with the organs or parts it covers or connects. Where there is much motion, it is sometimes disposed in a stringy or reticulated manner, and meshes are formed, filled with transparent fluid. Another morbid condition associated with these false membranes is that of serum or sero-purulent fluid being collected between the peritoneum and the false formation, until the latter is raised up and loosened from its attachments and set free in the sac. When these adventitious membranes remain firm and adherent, the original serous membrane beneath them disappears, and their surface assumes the characteristics of a veritable serous membrane, and it is difficult to distinguish the new from the old. The former secretes a lubricating serum, is influenced by the same kinds of irritation, is liable to become inflamed, and in its turn to throw out true inflammatory products.

The attachments effected by these formations may subsist through the remainder of life. They may be protective and conservative. In the suppurative stages, when abscess forms in the solid viscera, this adhesive inflammation is the method which nature observes for the harmless exit of pus. These bonds of union may continue with little or no inconvenience. By the lapse of time they become thin and

contracted, and when health is re-established and the absorbents are active, they may partly or wholly disappear. Absorption begins with the subsidence of the inflammation, and as Rokitsansky remarks, it must, as a matter of course, be influenced by the thickness, that is to say the permeability, of the deposit.

Before the time of the two Hunters it was not by pathologists generally allowed that serous membranes secreted pus without solution of continuity; in other words, without the presence of ulceration. Since then this fact has been universally acknowledged. It may be secreted from the inflamed peritoneum, or from the surface of those adventitious membranes which are formed in the cavity. William Hunter says it is generally thinner than that of an abscess, and the containing surface is more or less covered with a glutinous concretion or slough of the same colour as the fluid, in some parts adhering very loosely, in others so firmly that it can hardly be rubbed off, but still the surface covered with these sloughs is without ulceration or loss of substance. Dupuytren and Villerme believe that the false membranes are concrete pus, and Rokitsansky is of opinion that pus, under some inherent peculiarity, is a degeneration of plastic exudation. It is more frequently seen in the asthenic, sub-acute, and lower types of the complaint than in the sthenic. In the inflammation of metastasis, when the blood is contaminated, in parturient women, and in children, it is most common. The fluid may be puriform, purulent, or sanious. It may be yellowish green, or brown, or reddish. The peritoneum and sub-peritoneal tissue are much injected, and there is usually great infiltration of the tissues. In some instances it appears as if exuding from the entire inner surface of the peritoneum; in other cases it is associated with adhesions, and is discovered in distinct collections, bounded by organized septa, and resembling separate abscesses. It may be evacuated by ulcerative absorption through the abdominal parietes; by the same process it may pass into the digestive tube, the bladder, or vagina, or through the diaphragm into the thoracic cavity, or effect an entrance into the bronchi, or it may find a way of escape by the *psoas muscle*.

The pressure exerted by purulent collections is doubtless the main cause of ulceration commencing, but Craigie believes that in these cases sometimes ulceration may result without pressure, being merely the direct and obvious effect of inflammation. My colleague at the Tunbridge Wells Hospital, Mr. Marsack, made an autopsy on the body of a young woman, on whom he had six weeks previously performed ovariectomy. The coils of the ileum were welded together, and joined to the abdominal walls by organized adhesions. Between the layers of the great omentum were small independent abscesses of creamy pus. In the lumbar region was a bounded abscess-like collection which contained half a pint of pus. At the sigmoid flexure ulcerative perforation was discovered. Pressure, caused by a collection of purulent fluid, had been followed by ulcerative absorption of the tunics of the large bowel. When this secretion is

effused in small quantity it may be absorbed, but if in large quantity and without opening, irritative fever is induced, the symptoms of pyæmia supervene, and it is then uniformly fatal. Sometimes adhesive inflammation in peritonitis gives rise to very peculiar pathological conditions. The stomach and transverse colon have, in several instances, been glued together, and ulcerative absorption has effected a communication between them, so that the fæcal contents of the large bowel have passed into the gastric cavity, and thence been expelled by vomiting. Two or more coils of the ileum may be soldered together, and an intercommunicating passage established in the same manner. In such examples the disease has generally become chronic.

In the partial or localized forms of Acute Peritonitis, when some foregoing visceral disease has extended through to the serous coat, and instituted inflammation in that tunic, we not unfrequently see circumscribed depositions of lymph cementing neighbouring parts together while the remaining extent of the peritoneum is perfectly healthy. In hepatitis, when the convex surface is inflamed, strong adhesion is sometimes discovered. The spleen is in like manner united to the concave surface of the diaphragm, and the accretion may have assumed a cartilaginous or ossific character, the latter conversion being in that situation more frequently seen than in any other part of the abdomen. In simple ulceration of the stomach sometimes adhesive ulceration averts a fatal catastrophe by agglutination to one of the solid organs, or, as it has been repeatedly witnessed, by the production of an aperture into the colon, or sometimes into the duodenum; and, in a few rare instances, a canulous opening has been spontaneously made through the abdominal parietes, forming a gastric fistula. In malignant disease of this organ, most frequently seen at the pyloric end, there is much soldering together of the adjacent parts; the peritoneum is opaque and vascular, and the sub-serous tissue is greatly injected and infiltrated not only with carcinomatous deposit, but also with serous fluid. The duodenum, as before remarked, occasionally exhibits partial Peritonitis from rupture, consequent upon ulceration of the mucous and muscular coats, as the result of extensive burns, but its serous investment is more frequently inflamed from the irritation and pressure resulting from cancer of the head of the pancreas. When the jejunum is found morbid it is almost always in connection with the lesion of other organs. With regard to the ileum, what has above been said relative to the perforation of its peritoneal covering was descriptive of its morbid appearances. In phthisis sometimes protracted colliquative diarrhœa gives rise to ulceration in its mucous surface, but perforation in phthisis is exceedingly rare; it is, however, in this complaint occasionally beheld on or near the vermiform appendix. In chronic dysentery the colon may give way, and in such instances there is great destruction of the other tunics proper to the bowel. Such examples occur in those who have died after long residence in tropical climates, and in association

with some form of hepatic disease—very generally with abscess of the liver.

In Puerperal Peritonitis, according to Lee, the appearances of inflammation are sometimes confined to the uterus, but they are much more generally extended to other organs. The lymph is mostly thrown out in thicker masses upon the uterus than in any other situation, and this viscus seems to suffer in the greatest degree. In the sub-serous cellular tissue serum and pus are often deposited. The cellular tissue surrounding the vessels of the uterus where they enter and quit the organ, and that connecting the muscular fibres, is often surcharged with serum and purulent fluid. The peritoneum becomes thick and vascular, more especially where it invests the uterus and pelvic viscera, and sometimes, when the malady is intense, the serum is mixed with blood, and pus is found in the pelvis. When death has rapidly followed, the lymphic exudate is semi-fluid, or the surfaces which have become agglutinated are readily torn asunder. The Fallopian tubes and ovaries are sometimes filled with pus or blood.

In the Peritonitis of Children the abdominal viscera are found matted together and adherent to the abdominal walls. In some cases the viscera are covered with a thin greyish opaque covering, which feels soft and unctuous, and a turbid, reddish serum in which small flocculi are floating is effused in varying quantity. In that strumous affection which, according to Gregory, gives rise to peritonitis, pus is secreted. And this physician asserts that sometimes the abdominal cavity will be abolished, the viscera being united in one mass, and everywhere adherent to the parietal peritoneum, the latter in all its duplications being thickened, and the soldered intestinal convolutions inter-communicating. When the peritoneum becomes inflamed consecutively after scarlet fever, measles, rheumatism, or some other fever, an excess of serous effusion is discovered, the albuminous portion being inconsiderable or almost absent. The fluid is of whitish straw-colour or of dirtyish red.

DIAGNOSIS.—The more severe forms of acute peritonitis are fully expressed, and the disease cannot well be mistaken; but in the sub-acute and more partial descriptions, when the disease is not a primary but secondary complaint, or a complication, it may be so masked, mixed up, and confounded with the symptoms of other morbid changes as to render the diagnosis very difficult. In all instances the physician should pay marked attention to the history of the case, as well as to the objective and subjective symptoms, because there are affections which when superficially reviewed simulate this complaint, and it has not infrequently happened that the ignorant or off-hand practitioner has fallen into grave error. The diseases which it most resembles are gastritis, enteritis, colic, rheumatism, neuralgia, hysteria, obstruction of the gall-ducts, renal calculus, and lead-poisoning. With respect to *gastritis*, it is in this country, as I have before observed, rarely or never met with as a

purely idiopathic affection. Abercrombie means by this term inflammation of the mucous membrane, and it is in such sense that it is now employed. When the mucous coat takes on this morbid state there may be pain on deep pressure, the sickness is urgent, the thirst distressing, and fluids are constantly ejected. It can almost always be traced to some exciting cause. In peritonitis there is more difficulty in the etiological conclusion, and in the latter the pulse is smaller and more wiry. The inflammation may commence in the digestive surface and extend to the peritoneal investment, and it then, of course, becomes partial peritonitis. It occasionally occurs when the gastric portion of the peritoneum is roughened by lymphic exudations that auscultation can detect some friction sound; but this, however, is seldom heard. In the great majority of cases gastritis is referrible to acrid and corrosive poisons. Haller knew it produced by the patient having taken cold water when he was heated. It is frequently very difficult, often absolutely impossible, to diagnose peritonitis from *enteritis*. Inflammation may begin in the mucous membrane and implicate the peritoneum, or peritonitis may at length involve all the coats of the bowel, when both diseases obtain. The vomiting is more urgent in enteritis, the bowels are often obstinately obstructed, and gangrene is sometimes the result. The pulse is of better volume than in peritonitis, and as the rule the patient does not complain of so much pain. In peritonitis, partly owing to the involution of the parietal peritoneum, the pain on pressure is more acute and superficial, the patient is more averse from motion, the respiration is more thoracic, and the features are more collapsed.

In *Colic*, which may be from simple flatulence, the pain and distension may be severe, and even the face may be an index of suffering. When there is very great distension pressure may increase the pain, but more commonly pressure relieves rather than augments it; the circulation is little if at all affected, and there is no symptomatic fever. Frequently constipation and vomiting are associated with other symptoms; the patient complains of a twisting, wringing pain at the umbilicus, which comes on paroxysmally, and there are intervals when the suffering is inconsiderable or absent. This condition of colic is, when regarded alone and as simple colic, not an important affection, but it sometimes comes on as the herald of a more grave disease, and ends by the development of inflammatory symptoms. In *Colica Pictonum* there is no apparent obstruction of the bowels, although there are the common symptoms of ordinary colic. There are constipation and abdominal pain, even violent pain—*Dolor Atrox*—but there are other symptoms, such as pain in the head and limbs, a blue, leaden line in the gums, and loss of power in the hands and fore-arms, and the patient is either a painter, or investigation discovers that he has in some way been subjected to lead poisoning. The abdominal muscles in *rheumatism* sometimes are rendered so excessively painful that moderate pressure

causes great suffering, and notwithstanding that examples are occasionally observed in which acute peritonitis has thus supervened, yet such instances are very exceptional, and ordinary observation will generally prevent any mistake in diagnosis. Negative facts will be our chief guide. In such cases the circulation is little affected, the pulse is large and full but not frequent, sickness and vomiting are not present, the countenance has not the pinched, anxious expression which it assumes when the peritoneum is inflamed, and if the abdomen be carefully examined the tenderness will be found more severe at the origins and insertions of the muscles; lastly, it will be shown upon inquiry and examination that rheumatism has recently obtained, or that its symptoms are still present in other parts of the body.

Neuralgia is another affection which mimics peritonitis. The pain is described as a tight girdle or ligature passing round the body, and imparting a feeling of constriction; it traverses the course of the genito-crural nerve, percussion on the spinal processes detects some tenderness, and the legs and genito-urinary organs are often more or less affected; again, there is the absence of tympanites, pain on pressure, quick pulse, facial collapse, and other phenomena so expressive of peritonitis, and which I have in detail described above. In that protean malady *Hysteria*, which mocks this as it simulates so many other affections, the patient is apt to complain of increased pain almost before the hand has really touched the abdomen, and when it does touch it, the pressure does not, as in peritonitis, augment it. The pulse is natural, the tongue clean, and the countenance does not bear the impress of severe and acute disease. The breathing is not thoracic, the legs can be extended, the decubitus is not dorsal, and borborygmi and intestinal flatulence are often present; again, upon inquiry, it will not infrequently be found that large quantities of pale or colourless urine have been voided, that the uterine functions are at fault, or that some ill-defined spinal symptoms obtain. A comparison of the leading features common to the two affections will leave but little doubt as to the true nature of the ailment.

In *Obstruction of the Gall-Ducts* from calculi, inspissated gall, tumours, spasm, and other causes, the pain is paroxysmal, often excruciating; and with the passage of the obstructing body, and the restored patency of the canal, the suffering at once subsides. There is no pyrexia, the heart's action is little or not at all accelerated, nor is there distension or abdominal tenderness. In addition to such negative there are positive facts; the symptoms of biliary disturbance are mostly present, the alvine dejections are often light-coloured, the urine is dark and porter-like, the conjunctivæ are yellow, the skin is tawny, and the pain is localized beneath the margin of the right false ribs. In *Renal Calculus* the pain radiates from the back round to the abdomen, it comes on suddenly, courses down the direction of the ureters, in the male produces retraction of the

testicle of the same side, and shoots down the thigh, when for a shorter or longer interval it declines or entirely subsides, and bloody urine is a common accompaniment.

In Puerperal Peritonitis the *After-Pains* are associated with contracted, not relaxed uterus, which is the fact in peritonitis; they gradually diminish, and in thirty or forty hours have become much less in force and frequency. Inflammation of the peritoneum commences at the ordinary date of the after-pains' decline. The remedial agents which relieve hystericalgia do not arrest acute peritonitis. *Ephemeral Fever* is distinguished by its brevity, its milder aspect, by the mammæ remaining of normal size, and those serious conditions which mark the advent of an inflamed peritoneum are wanting. Lastly, in speaking of the diagnosis of this affection, it must be borne in mind that under grave cerebral disease, when nervous sensibility is obtunded, the peritonitic symptoms may be rendered very obscure, and under such conditions diagnosis may be impossible.

PROGNOSIS.—The opinion to be arrived at relative to the result of this disease will be modified and determined by a variety of considerations, and in every case a different array of facts will be presented, all the bearings of which should be carefully scanned. The asthenic is less auspicious than the sthenic type, and when it is the inflammation of metastasis the chances of recovery are less. In *unfavourable* cases, in despite of the best-ordered means of treatment, there is a progressive aggravation of all the cardinal symptoms; the pain does not decline, nor do the distension and the tenderness abate; the breathing is more hurried, shallower, and entirely thoracic, the pulse becomes thready and intermittent, the sickness is excessive, the bowels are generally confined, distressing singultus supervenes, the surface becomes cool, is clammy and relaxed, the legs and feet are cold, the patient falls down in bed with knees drawn up, lies on his back, the Hippocratic countenance is more marked, and often the mind is clear to the end. He sinks by asthenia. In those instances when we can prognosticate a *favourable* termination, there is remission of pain and tenderness, decline of the distension, the sickness comes on at longer intervals, and at length abates; the pulse is slower and fuller, the temperature of the body equable and warm, the respiration is not so quick, and the diaphragm descends lower down, and the patient can turn on his side. When we have reason to believe that there is perforation of the bowel, rupture of the liver or spleen, the urinary or gall-bladder; when we suspect the evacuation of an abscess or the effusion of blood, our prognosis must be unfavourable, and recovery under such conditions is well-nigh hopeless. In the consecutive form, when the strength has been undermined by a previous malady, the probabilities of a fatal issue are great. In Puerperal Peritonitis antecedent hæmorrhage and the amount of exhaustion induced by parturient efforts would influence our decision.

TREATMENT.—In every example of acute peritoneal inflammation the remedies should be prescribed with a just reference to the emergencies of each particular case, because no trite and exact rules can be given admissible of universal application. The date of the disease, the powers of the patient, the kind of pathologic action going on, and the antecedent circumstances so far as they can be ascertained, in conjunction with other facts, must needs modify our resources, and be suggestive in the selection of those agents which are accounted as the most effective auxiliaries in combating the affection. That this disease, like many other ailments, when seen at the outset, and treated according to science and experience, can be guided and carried to a successful termination is of such every-day proof as not to require being insisted upon here. And on the other hand, if its progress be unrestrained by ignorance or timidity, it soon passes beyond the control of the most vigorous handling and the nicest skill. It is eminently one of those complaints which does not admit of vacillation and delay; promptitude and decision of purpose being of paramount importance.

In an acute attack of inflammation of the sthenic type, in the muscular, strong and hitherto healthy, and especially those who have lived in the pure air of the country, one of our best allies is moderate *blood-letting*; it is successful when performed at the commencement of the malady—as soon as possible after the pulse has become hard and quick, the pain urgent, and the disease established. It is then, by making an impression upon the circulating organs, that there is the greatest chance of those morbid processes being arrested which so quickly follow the development of the affection. Nor should we be deterred from the use of the lancet by the mere *smallness* of the pulse, because it may feel constricted, hard, sharp, wiry under the finger, for with the emission of blood it will increase in volume and become soft and more natural to the touch. Before any blood be drawn the urine should be carefully tested. If renal disease be present, the abstraction of blood in any form would be utterly contra-indicated and positively perilous. It can only safely be had recourse to when the kidneys are found to be healthy. And if there be organic disease of any of the other viscera the employment of the lancet will not be indicated. According to the views of modern pathology, this remedy henceforth must needs be exceptional. In a disease so dangerous the patient should at the outset be seen every two or three, or at least every three or four hours. It is within the first twenty-four hours that blood-letting is of the most avail. When effusion has set in, blood-letting is more likely to be harmful than useful. In the young and the robust, in those of ruddy complexion and high arterial action, and those who live, as remarked, in the pure air of the country, bleeding is much better borne. The dwellers in urban communities, especially amongst the badly nourished and ill clad, such as present themselves at the hospitals of the metropolitan cities and large towns, very rarely, if ever, require general blood-letting.

Cupping is of course, from the pressure it would give, inapplicable; but leeches may be applied to the abdomen, and often with the greatest benefit. Fomentations, by means of flannels immersed in hot water, and wrung out as dry as possible, the heat and moisture being kept up by their being covered with a large piece of oiled silk, is good treatment, and the flow of blood can thus for some time be promoted; or a large linseed-meal-and-bread poultice, or a bran poultice, produces a soothing effect. In the use of these applications, however, care should be taken to constantly renew them before they become cool, and when they are discontinued a dry hot flannel of three or four folds should be placed upon the abdomen. Another very valuable mode of treatment at this juncture is the employment of terebinthinate epithems. Two or three dessert-spoonfuls of the spirits of turpentine may be sprinkled over the wet flannel, or a large piece of spongio-piline the size of the abdomen may be wrung out of hot water, and the turpentine in like manner sprinkled over it; and these may be repeated two or three times if the patient can endure the applications. I can bear testimony to the very excellent effects of the external use of turpentine, which I have very frequently in this mode recommended, and I believe it to be a most valuable remedy.

Sutton of Greenwich was the advocate of cold applications in abdominal inflammation. He used cold enemata, and cold cloths made wet with evaporating lotions, and, as he asserted, with great benefit. Abercrombie also recommends this method of treatment. In a considerable number of cases, says this physician, I have used with evident advantage the application of cold by covering the abdomen with cloths wet with vinegar and water, or even iced water. Injections of iced water have been proposed, and I think it probable might be used with advantage. M. Smoler of Prague has recommended cold compresses often renewed, and laid on the abdomen, their application being desisted from as soon as the patient sleeps; but he never allows the patient to change them with his own hands. Not having any personal experience of cold appliances, I shall therefore not do more than mention a remedy to the success or otherwise of which I can bear no testimony. It would to myself at least seem of doubtful utility in many cases, and one involving great risk in others, and I prefer what I believe to be equally efficacious, and certainly safer, namely, warm fomentations.

After the abstraction of blood a large dose of *opium* should at once be administered, and one or two grains may be given in urgent cases. It then not infrequently happens that the patient has a tranquil sleep, after which he awakes with less pain, a moister skin, and with remission of the symptoms generally. In those instances in which sickness and vomiting from time to time come on, opium often acts more beneficially. If we wish to influence the system by mercurials, one grain of opium and one grain of calomel may be taken every six hours, and mercurial frictions on the thighs and

in the axillæ can at the same time be adopted by means of the linimentum hydrargyri, which is perhaps the most convenient preparation for this purpose. Another mode of administering opium, especially when the stomach is irritable and ingesta are rejected, is by enemata. Thirty or forty drops of laudanum can be injected in two or three ounces of starch gruel, and such repeated according to the exigencies of the case. If the bowels should be loose and the rectum inclined to expel its contents, a suppository, composed of a couple of grains of solid opium with a sufficient quantity of Castile soap or cocoa-nut butter to form a conical mass, may be introduced *per anum*, and such from time to time as the physician may deem desirable. Or the subcutaneous injection of the solution of morphia may be rendered available. The indications denoting benefit having accrued from the above-named remedies will be mitigation of pain, softer and fuller pulse, easier and slower breathing, more relaxed skin, and diminution of the abdominal distension; the face, too, will look calmer and more natural, and the patient probably give expression to a more comfortable feeling.

Vesication is another of our aids, but vesicants should not be applied at the outset of the attack. They are most advantageous when the initiatory symptoms are on the decline, when there is no high arterial action, and when the surface has become cooler. I have seen them do harm when applied too early. The blistered part may afterwards be dressed with savin ointment, by which means a modified and beneficial amount of counter-irritation can be continued.

When the stomach is so irritable that scarcely anything can be retained, *hydrocyanic acid* in an aqueous mixture, with a little glycerine or mucilage added, is one of the best of remedies. *Effervescing draughts* with the bicarbonate of potash and citric acid are sometimes given, but the evolution of carbonic acid gas by distending the organ makes it contract upon itself, and the contents are again pumped up. There is another objection to their use; as tympanites always in greater or less degree obtains, the distension of the stomach pushes up the diaphragm still higher, and renders the respiration more difficult; and, again, the neutral salt which is formed, by acting as an aperient, is liable to increase the peristaltic action of the bowels, a result which should be most sedulously avoided. When the tympany is considerable a *fœtid injection* consisting of two drachms of the tincture of assafoetida in half a pint or a pint of decoction of pearl-barley may be administered; or half an ounce of oil of turpentine, first being made into an emulsion with the yolk of egg and then mixed with the same quantity of barley decoction as before mentioned, can be injected. The oil of turpentine taken in doses of ten or fifteen drops in some emulsion or bland drink, or five or eight grains of the compound galbanum pill, every six or eight hours, are good measures for adoption. When such do not produce the desired effect, O'Beirne's

long elastic tube may be introduced high up into the bowel and there allowed to remain, by which means incarcerated gases find a ready way of escape and much comfort is experienced. It is when this condition of tympanites subsists, and gives great distress after the inflammation has ceased, that such measures are useful. When we do not feel certain that the inflammatory action has subsided, and when vesication has not removed the cuticle, terebinthinate embrocations are likely to be of service.

Constipation is another circumstance which in these cases generally obtains. A right and rational consideration of this matter is of cardinal importance, because the very wrong notion is sometimes entertained that the bowels must be moved, and under this erroneous reasoning drastic purgatives have been given, producing much mischief. The physician should bear in mind that the constipation is not the cause but often the *effect* of the inflammation, and that the indicated mode of procedure is first to subdue the inflammatory action, when in due time restoration of function will follow. To allay and mitigate peristaltic action—in other words, to give rest to the parts in a state of lesion—is to carry out the same principle observed in enjoining the disuse of a torn muscle, and in peremptorily excluding light in the treatment of an inflamed eye. If it is believed that there is great accumulation in the colon, an enema with olive oil and half an ounce of the spirits of turpentine in decoction of barley may be administered by means of the O'Beirne tube, and such may be repeated if deemed necessary; but there is benefit in frequently having recourse to this remedy in order to keep up gentle action of the intestines. To give purgatives by the mouth is often to set up or augment the irritation in the gastric mucous membrane, and by increasing the peristaltic action in the bowels to aggravate the disease. The contents of the intestines are often but soft and pasty matters, and then their presence can do no harm. There is a far greater liability to error in being too solicitous respecting the movement of the bowels than in leaving them to the efforts of nature.

Diaphoretic and *diuretic* medicines are to be used with the foregoing. The acetate liquor of ammonia, the ætherial spirits of nitre with camphor julep, form a good mixture, and tend to keep the skin and kidneys in the performance of their functions. Small quantities of strong beef-tea or farinaceous food are to be given at intervals. Smoler of Prague gives a little broth once or twice daily, and as little drink as possible while the activity of the disease continues. Urgent thirst may be allayed by pieces of ice being put into the mouth.

Such, then, is the line of treatment to be pursued in the *sthenic* or more flagrant forms of inflammation of the peritoneum, but they are not often met with, and constitute exceptions rather than the rule. It would be out of place here to enter upon that troubled question, the change of type in disease, but certain it is, whether

from agencies operating from without, or from causes originating in the organism itself, that depletion in this disease is rarely warrantable; nevertheless it would be wrong to pass into that extreme of inertness which has of late become but too prevalent, for, as I believe, moderate blood-letting in rightly selected cases is yet, despite the confusions of controversy and the caprice of fashion, a valuable remedy.

As observed, by far the greater number of cases of peritonitis presented to our notice are of the *asthenic* type—in that adynamic state of the system that will not bear lowering, and in which the general strength should be husbanded, not destroyed; for instance, in such examples as are consecutive upon or the sequels of some foregoing malady, when following the eruptive fevers, when metastatic of erysipelas, when there is the complication of albuminuria, where it occurs in perforation of the bowel in enteric fever, in the bursting of a mesenteric gland, in phthisis abdominis, in those occult blood changes which affect general nutrition, as in cancer, struma, and the climacteric period, or cirrhosis and cardiac disease, and in contamination of the fluids, as in pyemia and puerperal peritonitis. When we have to treat it as related to such conditions, our remedial measures must be resolved upon with great modification. *Opium* in the asthenic form is the chief agent, and Graves and Stokes were among the first physicians who gave this drug largely. An impression decided and speedy must be made upon the nervous and sanguiferous systems, and in such lies our main hope of arresting the disease. It should be given in larger doses, and the effect kept up in full and apparent manner, but not to the induction of narcotism. Two grains may at first be prescribed, and a grain every four or six hours afterwards. In these perilous attacks of illness the patient should be frequently visited, and the physician should cautiously watch the effects of the remedy. Narcotism will be produced much sooner and with a far less dose in some persons than in others. If there be much sickness, laudanum injections should at short intervals be administered, instead of giving the drug by the mouth. In cases of great prostration and debility, quinine and camphor may be conjoint with the opium. In *perforation*, when the contents of the bowel are liable to be extruded into the serous cavity, and when lymph is thrown out, by which means the conservative attempts of nature are to seal up the orifice and mend the breach, to subdue and still the action of the part is everything. Motion implies the pouring out of the intestinal matters, the removal of the lymphic plug—in other words, a fatal issue. To paralyse the bowel for a time is the aim, in order that reparation may be favoured. In these particular cases I would not give mercurials by the mouth. If they were to increase the flow of bile, and thus augment the peristaltic action, they would do incalculable harm. It is far better to depend upon opium. In perforation there is sometimes great tolerance of this drug. Murchison has known so

large a quantity as sixty grains to be given in three days with impunity. In traumatic wounds, in the operation for hernia, and in paracentesis abdominis, the same kind of treatment should be followed. Fomentations, turpentine stoups, or a large poultice may at the same time be employed. Subsequently vesication may be ordered.

In that kind of peritonitis complicated with Bright's disease, the primary complaint should be more regarded than the intercurrent affection. Salivation is to be carefully avoided; diaphoretics, warm cataplasms, rubefacients to the loins, warm baths, the hot-air bath, and nutrients are then indicated. When the acute symptoms have subsided, the compound jalap powder and Dover's powder may be given. When the attack follows the exanthemata, is metastatic of erysipelas, or connected with pyæmia, mercury is inadmissible, and would be most harmful.

In *Puerperal Peritonitis* the treatment is often difficult and doubtful, and it should earnestly be borne in mind that it is frequently associated with or consecutive upon an altered or vitiated condition of the blood. Ferguson in doubtful cases gave ten grains of Dover's powder, and covered the abdomen with a linseed-meal poultice, which from its thickness would keep warm for four hours. At the expiration of that time, if the symptoms were not relieved, ten grains more of Dover's powder and another poultice were prescribed. If in other four hours from this second medication the malady did not yield, he had recourse to depletion. Sometimes when the pain is great and the pulse tolerably firm, one or two dozen leeches at once applied and followed by fomentations give good results. In the majority of cases, measures will be required which have previously been described as suitable to the asthenic type of this inflammation.

In the *Peritonitis of Children* those general principles are to be aimed at which have already been given. It need scarcely, however, be more than mentioned here that these little patients always require their maladies to be managed with a gentle hand, and most especially in the use of opiates. These remedies with them are very uncertain in their effects, and sometimes produce a far greater impress upon the general powers than calculated upon by the practitioner. The age, the history of the case, and the cardinal signs will be our guide, and our measures should be modified according to the facts and exigencies of each particular instance. In the sthenic types, regulated doses of opium, linseed-meal poultices, terebinthinate epithems, warm baths, and injections are to be used. When the affection comes on as the sequel of one or other of the eruptive fevers, if we believe it to be traceable to some constitutional malady, some depravity of the organism, depletion and antiphlogistic means will be unwarrantable; then mercurial alteratives, small opiates, fomentations, warm baths, and counter-irritation will be the best measures. When the little patient tides over the more perilous

days of active disease, and the case drifts onwards towards the more chronic condition, and when we find that there is effusion, counter-irritation and mild mercurial alteratives should be given, and during convalescence the iodide of potassium with decoction of sarsaparilla, the syrup of the iodide of iron, or quinine with the tincture of the perchloride of iron, often produce excellent effects. In the strumous diathesis cod-liver oil may be prescribed.

It has in this article been previously pointed out to the reader that peritonitis not seldom occurs in a partial manner, and as a *complication* arising in the course of some foregoing disease, as when an antecedent malady, first instituted in some organ or organs covered by the peritoneum, is at length extended to it. For instance in hepatitis, when the convex surface is the seat of lesion it remains circumscribed; or the inflammation may be extended through to the pleura, and pleuro-pneumonia result, as in a case which I recently witnessed. It is then quite clear that our remedies should be addressed to the viscera involved, as well as to the serous membrane. In acute splenitis the turgor of that viscus should be relieved, or it would be vain to try to mitigate the peritoneal symptoms, which have their origin in the stretched, tense, irritated condition of the capsular coverings. In the liver affection we should as soon as possible bring to bear the influence of mercurials; but in diseases of the spleen, mercurials are most improper and would do harm.* It is incontestable then that our diagnosis must be rightly formed, or our practice will be incorrect. In diarrhœa and dysentery, when associated with an inflamed peritoneum it is useful at once to control the excessive action of the bowels, and when such is subdued, the irritation extended to the serous membrane is likely to be subdued also. Opiate enemata, fomentations, the compound ipecacuan powder, and counter-irritants are the best measures. It has been remarked that the right iliac fossa is often the seat of pain, the disease being located near the cæcum, and it sometimes happens that the impaction of indurated fæces has much to do with setting up the inflammation. Large bland enemata, by unloading the great bowel, are in such cases of excellent service. When the sexual and urinary organs are first affected and peritonitis becomes superadded, the primary disease should be held in view, and by its mitigation or removal the consecutive complaint will be benefited. From all, then, which has been said, it is obvious that in the treatment of every case the successful issue will greatly depend upon a clear and correct conception of the nature of the ailment, and a right interpretation of those symptoms which indicate the particular kind of morbid changes which obtain.

When the more acute stage shall have passed over, and those remedies suited to the earlier period of the attack have been employed, small doses of opium may still be given in combination with quinine or some of the bitter infusions. The various preparations of

* See article on Diseases of the Spleen.

iron are of great value, and perhaps the tincture of the perchloride is the best. It is safest to defer as long as possible the use of aperients, and in preference the gentle action of the bowels should from time to time be promoted by bland enemata. When the active state of the affection has quite ended an occasional dose of grey powder with rhubarb and the bicarbonate of soda may be given. Terebinthinate and other stimulant embrocations can be applied to the abdomen when there is effusion, and a flannel bandage round the body, so as to ensure moderate and well-regulated pressure, is another mode of favouring absorption.

The *diet and regimen* during convalescence are of great importance. At the first soups and farinaceous food are to be allowed, and for some time solids should be interdicted. Arrowroot, tapioca, the Indian cornflour, with milk, are nourishing; and veal or chicken-broth with the crumb of bread may be given; and in the course of time beef-tea with toast, boiled chicken, and pounded meat may be taken. When stimulants are needed, sherry, weak brandy and water, claret, and bitter ale may be allowed. Flatulent vegetables and acescent fruits should for some time be discarded. An occasional warm bath to keep the skin in proper action is desirable. When the patient shall have so far recovered as to be able to travel, change of air will generally expedite his restoration to health.*

* This article, which was written for "Reynolds' System of Medicine," has been republished in this work by the kind permission of Messrs. Macmillan & Co.

VI.

ENTERITIS.

IN thus entering on the description of certain maladies within the abdomen it may be remarked that diseases of the abdominal cavity can hardly ever be so correctly interpreted as the diseases of the chest; because the modes of investigation upon which dependence is mainly to be placed do not confer that precise and discriminating knowledge of the existence and progress of morbid processes which is gained by percussion and auscultation, whereby another sense gives its aid in our enquiries. Again, within the larger cavity there are more liabilities to fallacy than within the thorax; in the former the motion and change of position of parts are to be well weighed and taken into account; the different degrees of distension or contraction, of fulness or emptiness of the alimentary canal, modify opinion; the sensibility, and not infrequently the abnormal thickness, of the parietes from excess of muscular and fatty tissues have to be borne in mind; the collections within and the many sources of obstruction incident to the digestive tube need to be fully considered; and the presence of tumours, glandular swellings, effused products, protrusions, and displacements of parts, acute tumefactions or chronic enlargements of the solid viscera, all constitute conditions and circumstances which give rise to embarrassments. This want of certitude, and the not infrequent difficulty which the practitioner encounters before arriving at a decision relative to the ailment which he has to treat, give to the class of affections there located more than common interest, and afford opportunity for the exercise of well-gained experience and practical acumen. The ancient writers and the older physicians did not fail to comprehend the doubt and ambiguity which from time to time obscure these complaints, and although amongst them both there were many close observers of nature, and not a little of subtle reasoning, yet such knowledge as they possessed was vague and indefinite, as compared with that established information which has accumulated in more recent times, and more especially in latter years. Still, notwithstanding a vast amount of pathological facts, and far greater nicety and precision in diagnosis, much remains pertaining to this class of affections yet to be accomplished.

DEFINITION.—In the attempt to concisely *define* inflammation of the bowels, or *enteritis*, as variously termed, it may be regarded as

mainly characterised by pain which may be paroxysmal, but which is increased by pressure; by quick and sometimes full pulse, but when the disease has extended to the peritoneal covering it is usually small, incompressible, and contracted; by rigors, dry tongue, and thirst; and fever and constipation, and distension of the abdomen, with diminished secretions and excretions. Sometimes there are dark scybalous stools, alternating with diarrhœa; and, especially when obstruction obtains, sickness and vomiting are the common accompaniments. There may also be stercoraceous ejections. A feeling of twisting and tormina, which may be more continuous or only experienced at intervals, is not unusual, and in graver cases the sickness and vomiting may be very distressing. Dorsal decubitus, often with the knees elevated, and accelerated thoracic respirations, are prominent symptoms. The facial indication is generally very characteristic of this kind of inflammation. In those cases which pass on to a fatal termination, the pain may with comparative suddenness decline, and the tenderness or pressure be markedly less; the general phenomena of collapse are then fully pronounced; the features look pale and sunken, the patient lies in a prostrate, helpless manner, and with little or no desire to alter his position in bed. The intellect itself remains unclouded to the close. Morbid anatomy mostly reveals a dilated, then a demarcated contraction of some portion of the bowels, and the inflamed part of the canal may be of very varying lengths. The extent affected is discovered of dark, bluish, livid colour, with increased vascularity, and there may be effusion of serum, lymph, or pus, or sero-purulent fluid, thickening, or atrophy of the tube, ulceration of the villous, or it may be of the peritoneal coat; and sometimes there is gangrene.

SYNONYMS.—*Χόρδαφος*, *Είλεός*, (Aretæus, Galen); Intestinorum Inflammatio (Boerhaave); Febris Intestinorum Inflammatoria (Hoffmann); Enteritis (Sauvages, Cullen); Cauma Enteritis (Young); Empresma Enteritis (Good); Entérite, Inflammation des Boyaux (French); Gedärmentzündung, Entzündung der Därmen (German); Inflammation of the Intestines (Pemberton, Abercrombie); Inflammation of the Bowels (Watson, Barlow, and other English authors). When the inflammation has been more particularly located in the mucous membrane it has been variously named Diarrhœa Catarrhosa, Catarrhus Intestinalis, Diarrhœa Mucosa, Splanchnia, Ileonia, Plei Inflammatio, Enteritis Erythematica (Cullen); Muco-Enteritis (Armstrong, Habershon); Inflammation of the mucous membrane of the Intestinal Canal (Abercrombie); Enteria (Craigie). In children: Inflammatory Diarrhœa (West); and Muco-Entérite, Entérite Villeuse by the French physicians. When the serous covering and mucous tunic have both been involved, the term Sero-Enteritis has very often been adopted, and when the ileum and colon have simultaneously been inflamed, Entro-Colitis and Ileo-Colitis are appellations which have been employed by numerous pathologists.

PRELIMINARY REMARKS.—Without entering into an unnecessary

detail of the terms and appellations which from the earliest to the present times have been employed in the nomenclature of the disease, it may be remarked that the variation of the words and phrases has been such as to signify the entire inflammation of the whole thickness of the intestine, or when the mucous and serous coats have been prominently affected; and such expressions as mucous catarrh, inflammatory diarrhoea, erythematic and phlegmonous enteritis, and similar names have by different authors been used; and again the several parts of the bowels involved have been made to confer a distinctive signification, and thus in modern pathology we meet with such figures of speech as entero-colitis, ileo-colitis, colitis, typhlitis, and even some have carried subdivision and refinement so far as to speak of rectitis. And if reference were made to a number of the leading authorities who have latterly written on this subject, it would be found there is not a little incertitude and want of exactness when the simple term enteritis is sought to be defined; some physicians still regard the word as meaning inflammation of all the coats of the bowel, some of one part of the intestines, some of another; and it must be confessed that the various interpretations given to the word have led to confusion and inconvenience. The great majority have used the term to designate inflammation of all the tunics, that condition which Cullen distinguishes as the enteritis phlegmonodea; in such sense Abercrombie regarded it, and thus did Barlow and Watson; again some apply it only to inflammation of the ileum; whilst Broussais considered it most particularly applicable to inflammation of the colon. The names of diseases are, however, often at the best but arbitrary distinctions, and if there be one fact more patent and indisputable than any other fact amongst the many conclusions which have forced themselves upon the conviction of modern pathologists, it is the truth that nice discriminations in the nomenclature of diseased actions exist more in mental conception than in the phenomena of nature; as parts and tissues lying in proximity, and organs known to have an intimate sympathy with each other, are upon that closer scrutiny and more exact manner in which morbid structures are now studied, found far more frequently to be simultaneously affected than once was supposed; and in inflammation of the abdominal viscera such is eminently the case. It is not affirmed that enteritis is never an idiopathic affection, because we cannot in every case trace it to an explicable cause, but in a very large proportion of the examples presented to the physician, it is the complication or sequela of some other and more general complaint, of some broadly-based and widespread ailment in the organism. Andral avers that disease of the alimentary canal occurs in the majority of acute affections; and further, that in the various exhaustive and chronic diseases it is rarely absent, and we know that in the pneumonia and pleuro-pneumonia of children, enteritic complication frequently ensues, that in hepatitis and renal disease the bowels often take on morbid action, and that in some forms of fever lesion

of the digestive tube is seldom absent. Andral says that in essential (enteric) fever, enteritic disease occurs in ninety-eight cases out of a hundred. MM. Petit, Bouillaud, Louis, and Bretonneau have also given testimony of its almost constant supervention in idiopathic (enteric) fever; and some other authors who have contended for the doctrine of the localization of fevers have regarded their essence, their characteristic quality, as that of glandular enteritis. In the more acute as well as chronic forms of tuberculosis, in pyæmia and in the strumous diathesis, the digestive tube is most prone to inflammation. It will hereafter be more fully insisted upon, that enteritis most commonly commences in the mucous membrane, and subsequently extends to the submucous, the muscular, and serous coats. It is true that sometimes the peritoneum is first affected, the disease then passing through to the other tunics, but such is far less common than the mode of extension before described; hence it is quite clear from these assertions that enteritis may begin in the mucous or the serous membrane, that it is, in truth, inflammation occurring to all the coats of the bowels, and that its correct description can only be ensured as thus contemplated. Pyæmic collections and abscess may first come on in the muscular coat and confer disease to the other tunics, but such instances are exceptional, and inflammation commencing in this coat is rare.

ETIOLOGY.—The *causes* of inflammation of the bowels are manifold, and some may be regarded as *predisposing* and others as *exciting*. It has been said that males are more prone to it than females, and if such be the case the far greater exposure of men to rapid transitions of temperature is unquestionably the main reason for this difference; and there is no doubt whatever that seasons and climates have their respective influences. In the autumnal and spring months, when warm sunny days are succeeded by chilly or frosty, intestinal complaints are more prevalent than when there is greater equability of temperature. Craigie has asserted that the spring and winter quarters generally show in Edinburgh an excess in the number of persons labouring under some form of intestinal disease. In some countries which lie low, as by the deltas of great rivers, where the atmosphere is laden with humidity, and where hot days are followed by cold nights, enteric ailments have been so frequently observed as to be regarded as endemic. But in such places, most probably, bad drainage and impure water ought to be considered in the causation, and under such circumstances it generally happens that the villous coat is mostly affected, that the symptoms are more or less of the adynamic type, and of the dysenteric or even choleraic character.

One of the most common causes of enteritis is exposure to cold, as by coming out of heated rooms improperly clad into the open air, by wet feet, sitting in wet clothes, sleeping in damp beds, or moist, badly-ventilated apartments, or on the humid ground, as when

soldiers are on active service and in bivouac. Sudden vicissitudes of the weather, doubtless, in delicate organizations and persons already predisposed, bring into operation this morbid action. It is also indisputable that by drinking stagnant water, like that which has been kept, and more especially during the summer months or in tropical countries, in tanks and cisterns, and surface water which has run through marshy districts and which contains organic matters, the same consequence is likely to occur. Indigestible and noxious articles of food are not an uncommon cause of this complaint, more particularly such as pork, shell-fish, long-kept potted meats, bad cheese, decomposing game, and hard innutritious and irritant substances which rather act as foreign bodies than proper ingesta; fruits which are unripe, and when eaten after ascendent fermentation has commenced in them, are by most authorities cited as liable to engender this disease; spirituous liquors, when taken in excessive quantity, are here to be enumerated; and also fermented liquors, such as cider, perry, and domestic wines, may be mentioned. Medicines given by mistake, or in improper doses, sometimes effect the same consequence; for instance, such hydrogogue purgatives as the various salines and elaterium; such drastic cathartics as colocynth, gamboge, scammony, and black hellebore, and such mineral irritants as arsenic, antimony, and calomel; and it occasionally happens, when the practitioner gives dose after dose of some acrid purgative for the relief of fancied or real obstruction, that inflammation of the bowels arises. Poisonous substances such as arsenic, oxalic acid, the perchloride of mercury, and the various mineral acids, when taken in large quantities generally produce fatal gastritis as well as enteritis. In certain hepatic affections a redundant flow of bile poured into the alimentary tube will institute such an amount of irritation in the villous surface, as to cause veritable enteritis.

There are other and more apparent causes to be mentioned, and which are of a mechanical kind, such as is the case in intussusception, when at the place of invagination great inflammation is produced; and in ordinary hernia, or in partial hernia, when a mere segment of the canal is bound down or pressed upon, and this without the absolute obliteration of the passage. Occasionally layers of lymph encircle the gut and strangulate it, and the end of the vermiform appendix has been known to become morbidly attached to the meso-colon, and thus form a loop through which the bowel has passed to be, as it were, ensnared. Sir Thomas Watson says he once saw the appendix literally tied round the intestine. Tumours, such as ovarian, and fibrous tumours attached to the uterus, sometimes set up such irritation, or so press upon the tube as to excite acute disease or effect positive stoppage; and contusions, injuries by sharp or blunt instruments, and surgical wounds, may also cause enteritis.

Occlusion from causes *within* the bowel may be briefly noticed,

such as the impaction of large quantities of indurated fæces, which most frequently occurs at the cæcal end of the large bowel, and sometimes gives rise to very severe attacks of enteritis; the collection of fruit seeds, such as those of the grape or orange, and cherry stones; and in Scotland and other parts where oatmeal is used as a staple article of diet concrete globular masses of the husks of the oat occasionally fill up the calibre; and a large biliary calculus has been discovered as the cause of inflammation. Cancerous growths, more especially in the large bowel, are liable to produce such thickening of the parietes as to obstruct the intestine and institute the evil consequence in question; and there are also more general causes, obvious and undoubted, such as certain morbid sympathies originating in the disease of other organs and referrible to the nervous system, and causes which depend not unimportantly on some diathetic influence. The retrocession or sequence of the exanthematous fevers, when contamination of the blood is present; the morbid condition of the circulating fluids in enteric fever, erysipelas, gout, and in pyæmia, and also in renal disease, are well known to be significant elements entering into the causation of enteritis. The absorption of noxious effluvia from the dissecting table may in conclusion be named; also the sudden suppression of certain discharges to which the body has been long habituated, such as of hæmorrhoids and catamenia.

SYMPTOMS.—A variety of symptoms mark the advent of inflammation of the bowels. It may come on suddenly or insidiously, and when it supervenes in the former manner, as it frequently does, a sudden sharp pain is often experienced, and the patient fancies that something within him has been torn, twisted, or put out of its place by some trifling exertion to which he has subjected himself, and this feeling is soon followed by abdominal tenderness, which is increased on pressure, and such tenderness is most generally first felt at the hypogastric, umbilical, or iliac regions. Sometimes, as Pemberton long ago observed, one of the earliest symptoms is pain over the loins, which shoots round to the head of the colon, and then darts up to the pubis; and although it is for a time circumscribed, it soon becomes diffused over the entire abdominal surface, and is much more severe. The patient winces under the slightest touch, and at length the mere weight of the bed-clothes cannot be borne. This pain of enteritis in some measure resembles the pain of colic, because it is often more or less paroxysmal, and this characteristic is doubtless caused by the extension of the disease to the muscular coat, whereby it is excited to irregularity of action, or to the occasional passage of flatus which is generated in excess by an irritated mucous membrane, but the pain of the former is increased, and the pain of the latter is relieved by pressure. In colic there are absolute intervals of ease, whereas in enteritis between the periods of exacerbation the pain never entirely subsides. In simple non-inflammatory distension of the bowels pressure, it is true, may give a

feeling of uneasiness amounting to pain, but the absence of that expression of anguish in the countenance so indicative of the graver malady, and other collateral signs, will to the practised eye show the distinction between the two affections. When, however, doubt is entertained, and the case is ambiguous, it is the safer plan to so act as if the worst ailment of the two were present. At the first the pulse may be full and quick, the skin hot, and the face flushed, and these conditions may alternate with chills and even rigors, but the pulse before long decreases in volume and becomes small, hard, and wiry; the tongue is often covered with a whitish fur, which becomes dry and brown, the tip and edges are preternaturally red, and there is urgent thirst; the respiration is diaphragmatic and intercostal, and in severe cases shallow and accelerated; the decubitus is on the back, the patient tosses his arms, but the trunk is kept still, the knees are drawn up, there is tumescence of the belly, and the integuments feel hard and tense. Sickness and vomiting generally add to the other sufferings, and more especially if the inflammation be located in the ileum or above that part of the canal; the ejected matters are often of a greenish, biliary colour, and a mucoid or thin watery fluid, or it may be that they are of decidedly faecal character, both in smell and appearance. In a great number of instances the bowels are confined from the first of the attack, or there may have been one or two liquid evacuations to which constipation has succeeded. Confinement of the bowels and tympanitic distension, in addition to the symptoms before described, are indicative of the peritoneum being involved. The urine is scanty and high-coloured. Sometimes there is retention, and there may be suppression of the secretion. In cases of obstruction the above-named phenomena are generally presented; in such instances, however, the sickness and vomiting are cardinal and distressing symptoms. They proclaim antiperistalsis, and the stercoraceous ejections always proclaim the seriousness and the danger of the disease. Barlow asserts that if the occlusion be in a deep-seated part of the bowel, there may be no tumescence, and the belly, instead of being distended, may be drawn in. The incessant vomiting, doubtless, tends to relieve the intestines of their distension, but I think it must be conceded after the inflammation of the peritoneum has become fairly established, that tympany is almost the invariable result; because the inflamed serous tunic paralyses the muscular coat, and then the tube loses its power of contraction, and because under such circumstances gases are generated in large quantity, or they soon notably accumulate when there is not the power of their expulsion, or with the advance of the disease, the distension often becomes excessive. There are other modes, and with the advance of the disease distension often becomes excessive.

The physician should always bear in mind that this disease cannot be diagnosed from any particular symptoms, however prominently pronounced, nor is there any single sign which can be regarded as

pathognomonic. The most trustworthy is that of pain on pressure, but such may signify merely simple, uncomplicated peritonitis. Nor can the kind of pulse be implicitly relied upon, because enteritis, in some cases, begins with very little disturbance of the circulatory functions; nor the condition of the bowels and the appearance of the dejections, because it may commence with obstinate constipation or harassing diarrhœa, and the stools are most varied, sometimes being slimy and scanty, sometimes dark, copious, and watery, and sometimes they look quite natural; nor the sickness and vomiting, because these may of course obtain when there is no inflammation whatever. To judge rightly, the entirety of the morbid phenomena must be reviewed. It occasionally happens that enteritis comes on in masked and covert manner; during several days previously there may have been some sensation of uneasiness, with occasional twitchings in the abdomen, to which the patient has not paid great attention, and which he has ascribed to costiveness; but an evacuation has not removed this unpleasant feeling; at length it has become a positive pain, and ultimately symptomatic fever and the severer conditions have become established.

There is another and very frequent form of its invasion, and that is by irritation of the intestinal mucous membrane. It then begins with colicky, pricking pains, a feeling of pungent internal heat and soreness, burning of the hands and feet, the appetite is much impaired, the tongue is covered with a greyish viscid fur, the tip and edges are red, the papillæ erect, there is great thirst, the skin is dry and harsh, and the urine is often high-coloured and generally diminished in quantity. One or more copious fæulent discharges take place which are pale and yeasty, and seem to contain pieces of crude, indigestible food, or it may be that they are dark and bilious. These are soon succeeded by watery, serous evacuations, which are large and irritating to the rectum, or by smaller stools of a glairy, stringy, mucoid matter mixed with opaque fibrinous flakes, or with streaks of blood; the abdomen becomes distended, and there are sickness and vomiting; and if the pulse have been full and forcible at the onset of such attack, it becomes quicker and softer in a relative degree to the frequency and amount of the alvine defluxion. A mere slight touch of the abdominal parietes does not give that acute pain which is so characteristic when all the coats have become inflamed, but if such steady and increased pressure be made as to bring the mucous surfaces into contact, pain is then very decidedly experienced. As the disease progresses the symptomatic fever, and the signs above given of the implication of the other tunics of the bowel, become more apparent. Sometimes membranous, elastic formations of lymph are voided, occasionally they are tubular, and moulded according to the configuration of the internal surface of the intestine, often of a whitish or light yellow colour, and they may be formed in either the small or large bowel, and sometimes are seen several inches in length. They have been most

frequently met with in sub-acute or more chronic examples of the disease.

When enteritis passes on to a fatal termination there is a gradual aggravation of all the characteristic symptoms, the pain becomes more urgent, the distension is greater, the sickness and vomiting are more frequent, the pulse becomes quicker, thready, and compressible, the respiration shallower, more accelerated, and entirely thoracic, the surface at length is cooler, relaxed, and clammy, the face looks sunken, and the eyes seem set in their foramina, the patient lies down in bed and on his back, and singultus and cold extremities too surely indicate approaching dissolution. When gangrene happens to come on there is an abrupt abatement of the pain; and there is a popular belief that such sudden decline of the pain towards the end always signifies the advent of the gangrenous change; but such is an erroneous impression, as excessive nervous exhaustion is, in the great majority of instances, the real cause of the diminution of such symptom. In gangrene the fæter is peculiar and excessively disagreeable. The mind often remains clear to the last, or wandering may not set in until shortly before death.

When the issue of the case is favourable the signs of improvement soon become observable, the pain decreases, the breathing is easier, the pulse slower and of better strength and volume, the sickness abates, the tumescence subsides, the surface is of equable temperature, and the thermometer tells of less heat, the patient can lie on his side, the stools are more natural, and the countenance at once indicates the amendment. Pressure can then be borne without uneasiness, nor are there tormina or twitchings.

PATHOLOGY.—Inflammatory affections of the alimentary canal exhibit a variety of phenomena; they differ greatly in their degree of intensity, and in those *pathologic* changes which are induced. They are much modified by the sympathetic influence of other organs, the state of excitability of the great nervous centres (more especially in the young), by the kind of complication under which they take place, the condition of the circulatory fluids, and the diathetic tendencies of the organism. Each part of the intestinal tube is in a peculiar and special manner related to certain viscera, and the functional disorder or more active disease of such viscera necessarily exerts a modifying influence. The bowels forming the great channel whereby effete and noxious matters are carried out of the body, it can be well understood in many grave affections both acute and chronic, when deleterious blood changes have taken place, how irritating materials transferred to the secretions, and brought into contact with certain surfaces and tissues, should institute localised disease. In the enteritic inflammation of enteric and exanthematous fevers the truth of this fact is eminently illustrated, and in many protracted and exhaustive maladies the same observations hold good; sometimes the entire system, from the operation of agencies not easily or perhaps not at all recognised, assumes a cachexia, and the morbid

changes from cumulative power, as it were, culminate in some particular organ or parts, and the emphasised expression of antecedent morbid processes is rendered manifest in the development of acute and local disease, and the part thus selected, or most prone to such local disease, is often the intestinal canal. Latham, in his account of the diseases at the General Penitentiary, aptly illustrates the truth of this position; he states that for months previously the general health of the prisoners had begun to decline, and at length the universal cachexy, as he terms their foregoing bad health, declared itself through the medium of the bowels. One or other of the tunics may first be affected, and the disease extends to the glands and follicles, or the converse; the latter may, at the commencement, be inflamed, and the inflammation be extended to the former. Abercrombie remarks that in all instances of intestinal inflammation the disease will take its character from the kind of structure in which it is chiefly located; if in the serous coat, there will be effusion, if in the villous, defluxion, and if in the muscular, gangrene. That enteritis is a disease fraught with very great danger, none conversant with its real nature will endeavour to gainsay, and it is of the greatest consequence that its morbid actions should be clearly comprehended, because a nice discrimination of its phenomena, and a correct diagnosis, are essential to its proper treatment; and if its symptoms are not at an early date combated by suitable remedies, it soon progresses to a fatal termination.

That form of inflammation of the villous coat of the intestinal canal which has been termed *enteritis erythematica* or *muco-enteritis* may be a very slight or a very severe affection; it may commence in simple irritation induced by sympathy, or it may be caused in a more apparent and direct manner, and the more immediate mode of irritation may be by substances coming in contact with the mucous surface. Passive hyperæmia may be produced in the mucous membrane of the bowels by obstruction, as, for instance, in cirrhotic liver, when the organ is so contracted that the blood cannot normally traverse it. The portal vein then becomes gorged, the splenic, gastric, and mesenteric veins are rendered turgid, and the capillaries from which these veins commence are so full and surcharged, that the transudation of serum takes place. In active hyperæmia of the villous tissue it is congested from abnormality in the arterial minute branches rather than from morbid change in the venous radicles; it is caused by excess of blood sent to the former rather than from its detention in the latter.

The vascularity at the first exhibits a reticular injection, and at length a red tint becomes diffused over the inter-spaces, until the whole assumes the inflammatory blush; during the recession of the inflammation the reticular injection again appears, and the larger vessels are the last to return to their normal calibre; sometimes the villi and the follicles are more injected than the membrane itself; a punctated appearance is then discovered, or small areolæ are to be

seen. The inflammation may be restricted to the mucous membrane without extending to the other tunics, and when such is the case the structures beneath are quite pale; it more frequently occurs, however, that the sub-mucous or one or both of the remaining coats are involved. The disease has a tendency to spread by continuity, and it often can be traced into the duodenum, when sickness and vomiting come on, or into the cæcum and colon, when diarrhœa supervenes. The morbid blush may insensibly shade off, or a well-defined line of demarcation may bound the range of the disease. The inflamed condition of this surface varies greatly in its rate of progress and results; its state of active turgescence may continue for some time with little alteration in the parts, or rapid softening and ulceration may take place; when the last-named changes supervene they are generally referrible to an antecedent blood contamination, and the disease is nearly always a consecutive and not a primary affection. It is true that the villous tunic may become inflamed after the serous and muscular coats, that is, the disease may begin from without, just as in pleurisy or pericarditis when the serous investment is quite inflamed or the pulmonary substance and the cardiac parietes assume the same morbid action. If external injuries and traumatic wounds be excepted as a cause, it rarely happens that the disease thus commences, and when it does come on in this manner it is more limited, and the lines of its extent can at once be observed.

One of the earliest and most invariable consequences of inflammation of a mucous surface is an excess of secretion, very illustrative examples of which are to be seen when the lining membranes of the bronchial and urinary passages are inflamed. The inner tunic of the intestinal canal is, in health, continually secreting a transparent, glairy, slightly acid mucous fluid, to which are added the proper secretions of the glands and follicles, also a certain amount of serum analogous to that given off by the serous membranes. Haller calculated that in a healthy adult the mucous surface, from the pharynx to the rectum, in twenty-four hours poured out eight pounds of secretion, and, if such estimate be true, under the irritation of acute inflammation the amount must be very considerably increased. When the tissue is thus morbidly affected, the microscope discovers a large number of cylindrical epithelium cells, and I have now under my care an example of this disease, in which these cells are to be detected very numerously in the dejections.

The morbid mucous products now spoken of are sometimes mixed with blood; under the hyperæmic turgor vascular rupture results, and the sanguineous effusion may be mere partial capillary exudation, and only so much as to produce insignificant streaks of blood, or it may be, by the giving way or ulcerative erosions of small vessels, in such large quantity as to make the stools appear as if they consisted wholly of blood. Such hæmorrhagic tendency is generally associated with variously-sized ecchymoses, which may be small stellate puncta, or large red or brownish patches which are formed by extravasation

into the sub-mucous areolar tissue, and sensibly elevated, or it may be connected with ulceration. In some instances lymphic exudations of an aphthous character are formed; some writers describe these appearances as croupous or diphtheritic, often polygonal in shape, especially pervading the edges of the intersacular constrictions or the edges of the valvules conniventes in the ileum, and these formations are voided in irregular membranous pieces: and sometimes the mucus is of fœtid odour and semi-purulent. When thus acutely inflamed, such infiltration and thickening may ensue as notably to contract the calibre, and tend to mechanical obstruction, whereby the symptoms are rendered more urgent; but as a rule it may be said that the danger of the disease will be relatively to the extent of surface inflamed, and not, as in bronchitis and laryngitis, when it rather consists in the degree of intensity in particular parts. When the disease has extended to the upper portion of the alimentary canal, and near to the stomach, a peculiar sinking feeling is often experienced, which is mainly caused by sympathetic impression made through the pneumogastric upon the cardiac plexus, and there is less liability to this sensation when the disease is further located from the stomach.

When the inflammation penetrates to the deeper structures, and the peritoneum becomes involved, the symptoms of peritonitis are superadded to those already obtaining, the pain is more acute, the distension is greater, and the characteristic effusions are given off into the serous cavity; and the peritonitic signs then assume the greatest prominence, and death may ensue from the intensity of the disease. In the more protracted, and in complicated cases ulceration and perforation may cause the fatal issue. The ulceration may be situated chiefly in the glands in small patches, or large portions of the membrane may be ulcerated. The true mucous membrane, as well as the muscular tunic, may become gangrenous. The sub-acute cases are to be distinguished by the inflammatory signs being less severe, and they are more apt to come on in a gradual and covert manner. In the more favourable examples of this affection there is often a very obvious tendency to spontaneous recovery.

The alvine discharges are very various in their appearance, and it is always of the greatest importance to notice their characteristics, because from their altered condition much can be learnt respecting the progress of those morbid processes which are going on in the digestive surface, and by which they are produced. It must be borne in mind, however, that too implicit reliance ought not to be placed on the state of the dejections, because there may be excessive discharge under simple irritation, and when inflammation cannot be truly pronounced; and, on the other hand, extensive, deep, fatal disease may obtain in the small bowel when the stools are fœculent and comparatively healthy. A patient may be harassed every quarter or half-hour and the complaint ere long pass off, or he may be moved only three or four times a day, and alarming disease may be present. As Aber-

Crombie remarked, the peculiar morbid discharges can only with distinctness be recognised when the lesion is in the colon; when it is in the small intestine the secretions are much modified by being mixed with the fæces of the large bowel, and pieces of undigested food can then be discovered; and again, when the colon remains healthy, there may be alternate attacks of constipation and diarrhœa. The colour may be pale and yeasty, dark and bilious, reddish brown, or even black, with all intermediate degrees of shade; and when mucoid and membranous a greyish-white or yellow colour may be presented. Sometimes the patient voids pure blood, or the stools may only be streaked with blood; sometimes the flux seems to consist of turbid serum, or it may appear like pure bile, which gives rise to a feeling of being scalded as it passes; and in other instances the fluid resembles chalk and water, and is intolerably fœtid and of immense quantity; and one of the simplest forms of excessive alvine defluxion is in the common summer diarrhœa. Under the influence of a high temperature the liver is excited to excess of secernent function, a redundancy of bile is poured into the alimentary canal, which institutes irritation of the villous surface; and there is then great augmentation of the intestinal secretions, and the abnormal accumulation of fluid stimulates the muscular fibres to unusual peristaltic motion, and numerous fluid stools are the result. Craigie says Cullen committed a pathological error when he believed the spasmodic action (*motus abnormis*) to give rise to increased evacuations, because the tube is first distended by the affluxion, and the *motus abnormis* is a consequence, not a cause of the spasmodic contractile efforts. And simple diarrhœa, which Cullen has arranged as a separate disease, is really but the symptom of antecedent diseased changes; the condition producing it is muco-enteritis, which may be acute, sub-acute, or chronic. When uncomplicated flux proceeds from other causes, such as some cachexia, malaria, or merely suppressed perspiration, the stools may differ very considerably; they may be pale, watery, and albuminous, or they may contain glairy, opaque, stringy mucus, added to which may be fibrinous flakes and fecal matter. Some have supposed that the colourless evacuations depend upon an excessive action of the mucous follicles, but the real cause is doubtless the arrest of the normal flow of bile into the intestines.

The ordinary diarrhœal character may at the first be presented, and the stools then exhibit changes according to the progress of the disease and the part of the canal which is most affected; and they may at the first be very copious, and gradually decrease in frequency and quantity, or they may be feculent and become large and watery. Sometimes they are thin, brown, or reddish, and bloody-looking, resembling water in which putrid flesh has been washed, and intolerably fœtid; and such appearances indicate change of structure, and when they are observable it often occurs that small organised fleshy lumps can be discovered, also scattered flakes of lymph. The pathological conditions associated

with these are softening, ulceration, and sphacelation of the mucous membrane, and from the red denuded patches on the digestive surface the hæmorrhage proceeds. In such cases the disease is of a dysenteric character, especially of such type as prevails in tropical countries, and the fleshy bits mentioned are detached necrosed pieces of the villous coat which have become destroyed, and when tubular and cord-like formations pass away aphthous crusts are generally deposited over a large extent of the gut. Sometimes muco-purulent matter, foetid, and streaked with blood, is voided without any admixture of feces; when such is the fact the affection is mainly located in the descending colon and rectum. This kind of evacuation may take place, to be succeeded by some amount of fæcal defection, which of course comes from a higher part of the bowel. When the ulcerated patches are scattered over the entire lining of the colon, there are few or no scybala, and the fæcal part is thin and diffluent. Ulceration of the small bowel may keep up continuous action of the entire tube, the stools remaining fæculent without morbid products being observable, and it often happens in such instances that close examination detects partially digested articles of diet, and when these are seen the disease of the upper part of the canal is always highly presumptive.

The glands and follicles of the digestive tract are very prone to be inflamed, but their inflammation is always a secondary affection. In chronic inflammation of the inner surface the Lieberkuhnian follicles and solitary and agminated glands are apt to become atrophied. It was at one time the opinion of certain French pathologists that glandular enteritis was the essential condition of the form of continued fever now distinguished as enteric; but this doctrine is no longer tenable, and physicians look to other causes than that, which is a mere complication in its course, for its production. In lesion of the vital fluids induced by vegetable or animal miasms, or by mal-assimilation, and in certain diatheses, more especially the scrofulous, these organs very commonly become morbid. In enteric fever, as will hereafter be noticed, the glands of Peyer are well-nigh always more or less diseased.

Acute Muco-Enteritis very often passes into resolution, when in the course of time the villous surface regains its normal condition; but it may also, as it not uncommonly does, pass into chronic disease, and more acute attacks, coming on at different intervals, supervene upon the chronic condition. When this is the case real recovery is exceedingly rare, because such repeated returns of the inflammatory phenomena imply permanent alteration of structure. There are then abiding dilatation of the vessels, tumefaction of the villi and follicles, hypertrophy of the submucous tissue, and a profuse viscid mucoid secretion; and there is also often a pigmentary deposit on the mucous membrane which gives it a dark colour, and the enlargement of the venous radicles adds to the livid appearance. This *catarrhal inflammation* may end in abscesses and ulceration, which pervade varying

extents of both the small and large bowel, but more especially the latter, and sinuses are formed which open on the internal surface. Sometimes there are numerous small and clearly defined ulcers, or large spaces of the membrane may exhibit red fungous elevations, whilst the intervening parts remain healthy. The secretion is purulent and mixed with blood; if the changes described are confined to the ileum, the morbid parts are difficult of detection, but if in the colon, they are readily observable. The mucous follicles of the colon and rectum are very liable to assume the ulcerative condition when the surrounding villous surface becomes injected and inflamed. The ulceration may produce partial or localized peritonitis; the union of two portions of the tube may be effected, and a fistulous communication established between them; or there may thus be adhesion to the parietes or to some of the solid viscera. When the disease has passed into this chronic state there is a most persistent flux, the patient loses flesh, and becomes greatly emaciated, the mesenteric glands enlarge, and death is gradually induced by asthenia.

When *Phlegmonous Enteritis* begins, as it sometimes does, spontaneously, it is mostly marked by much severity, the pain and vascular excitement are the earliest symptoms, and when the affection becomes fully established it often terminates fatally. In this climate it can rarely be considered a primary disease, and in nearly all instances it is, as before remarked, the localised expression of antecedent morbid changes. It sometimes commences suddenly and gravely, after which it gradually declines, and passes into a sub-acute or chronic condition, which continues for very indefinite periods. The pain is most frequently first felt in the umbilical or right iliac region, from whence it soon becomes diffused over the whole abdomen; at the onset it is paroxysmal, but ere long it is unremitting; it is increased, and not, like colic, relieved, by pressure; the patient lies on his back, with knees drawn up to relax the recti muscles, the breathing is thoracic, the pulse, after having been large and full, becomes small, wiry, and quicker, the features are sunken, and distension adds to the other causes of suffering; in fact, the complaint assumes very much the appearance of peritonitis; in peritonitis, however, the stomach and bowels are not necessarily affected, but in enteritis they are always affected, because there is, in the latter, inflammation of the muscular and generally of the mucous coats, in addition to that of the peritoneum. When this disease begins in the mucous tunic, as it frequently does, diarrhoea at the first obtains, but as the inflammation extends to the deeper tissues, this symptom abates, and often obstinate constipation ensues. In enteritis, not infrequently the bowels have been discovered dark and distended, these conditions terminating in an abrupt line of demarcation, and sometimes occupying one part of the tube, sometimes another; and relatively, according to the degree of peritoneal inflammation, are the prominence of the symptoms and the danger of the case. Phlegmonous enteritis may be present and end fatally when the previously described signs are indistinct and ill

defined, as when masked by cerebral disease, a fact which it is important to remember.

The first cognisable pathologic change is that of hyperæmia of the extreme vessels and vascular turgor; the capillary injection at the beginning imparts a mere blush, but the colour deepens, and at length the mesenteric vessels enlarge in calibre, and there is an obviously increased afflux of blood sent to the part; when, however, the transudation of serum becomes established the redness decreases. The same kinds of morbid phenomena are produced by mechanical obstruction, but when thus caused the pain and tumescence are more sudden, the symptomatic fever may for a time be absent, and such negative fact always renders obstruction highly probable. Sometimes a bridle of lymph, the remains of ancient inflammation, encircles the gut, or adhesion of some part of the intestine to the abdominal walls, or to some of the solid viscera, causes a coil of the bowel to twist upon itself, and obstruction is produced; or irregular peristaltic action may give rise to displacement, or the distension caused by idiopathic disease may be followed by invagination; again, a large gall-stone, a morsel of undigested food, as a piece of new potato, which the writer has known, or impacted fæces, or thickening by interstitial deposits in the inner tunics and their connecting tissue may cause the attack. An internal hernia sometimes institutes the gravest form of the affection, and in all instances of enteritis external hernial tumours should be looked for, and especially when sickness and vomiting come on. When there is obstruction without strangulation the symptoms are not so acute, nor does the complaint progress so rapidly. When there is intussusception bloody mucus is generally voided. In ileus, or, as it has been termed, the iliac passion, there is retrograde movement, the contents of the lower part of the tube are carried into the stomach, and there is stercoraceous vomiting; the tumescence is at the first localised, an enlargement can be felt at some parts of the belly when the flat hand is gently pressed upon it, and such feeling is produced by the distension of the gut commencing abruptly at some particular place in the course of the tube. When the peritoneum has become inflamed, the abdomen is then generally and symmetrically distended. When the point of obstruction is in the ileum, cæcum, or ascending colon, there is no marked fulness of the right lumbar region, which is the case when the transverse or descending colon is obstructed. Percussion will determine whether the bulging be from flatus or the accumulation of fæces. In an instance which some time ago came under my observation, in which there was carcinoma of the sigmoid flexure and upper third of the rectum, and which produced acute enteritis, the left lumbar region was full and resonant, and it was manifest that the distended sigmoid flexure had given rise to some displacement of the descending colon. According to Barlow, when the obstruction or part of inflammation is in the duodenum, very little urine is secreted, and

conversely, when the same obtains low down in the intestinal tube, the quantity of urine is not influenced, or it may be increased. The sickness, as before remarked, is more severe the nearer the disease is to the stomach, and in less degree the more remote from the stomach. In women acute enteritis can often be traced to irritation beginning in one or both ovaries. The portion of the intestinal canal below the parts inflamed is by sympathy stimulated to contractile efforts, and inspection generally discovers it empty.

Sometimes gastritis, which is rarely or never an idiopathic affection, at least in this climate, when caused by irritant and corrosive poisons extends downwards, and by continuity of structure gives rise to enteritis. In such cases, however, more especially in poisoning by the mineral acids, it often happens that some of the fluid has passed into the duodenum, and has produced congestion of the mucous surface, and at length severe inflammation of all the tunics has followed. Ulceration of the glands proper to this part occasionally causes enteritis; and according to Curling those of Brunner are prone, after large burns, to ulceration, and thus the peritoneum may be perforated, and death rapidly ensue. In albuminuria and pericarditis ulcerative inflammation of this part of the canal may occur; and in lesion of the pancreas when the head of the gland becomes enlarged, as it occasionally does by malignant disease, the mechanical pressure which it exerts on this part of the bowel, and the obstruction which is given to its contents, are often followed by circumscribed inflammation. That acute hepatitis is very frequently associated with inflammation of the duodenum has by some pathologists been prominently insisted upon, and is a fact which cannot be denied. It has above been stated that inflammation of the digestive surface is very likely to extend, and under this proclivity the disease spreads along the ducts and the branches of the portal vein, and thus icterus is often produced without any mechanical obstruction. In enteric fever the liver is frequently implicated, and the foregoing mode I believe to be mainly the manner in which it becomes affected; it is, however, indisputable that between the upper part of the alimentary canal and this viscus there is great sympathy, which is manifestly referrible to their intimate organic nervous connection, and Marsh, Graves, and Stokes, in their respective accounts of Irish fevers, have with much clearness illustrated this particular point of pathology. With regard to the jejunum, which is less liable to disease than any other section of the tube, when it is discovered in a morbid condition, there is almost invariably lesion of some other part of the intestines. The ileum, and particularly its lower third, is very often the seat of disease, especially in enteric fever and advanced phthisis, as will hereafter be observed. Its acute inflammation is not more frequently noticed in connection with intussusception than is that of the large bowel, and perhaps this symptom is discovered as often in the small intestine as in the colon. Some writers have asserted

that there is an equal tendency in the two divisions of the tube now named to invagination; hence it would seem that the dimensions of the calibre have little influence in determining that result. The inflammation of the ileum is sometimes bounded by the ileo-cæcal valve, but the affection often extends into the colon, when sero-sanguineous or sero-purulent fluid, mixed with partially digested food, is voided with fecal matter.

The cæcum is sometimes inflamed without the extension of the lesion either into the ileum or into the colon, and Copland says it is not infrequently the seat of dangerous and fatal diseases, without any other part of the digestive tube being affected. The office of this viscus being that of a kind of second stomach, in which the last act of digestion is performed, where the contents of the tube are longer retained than in any other part of the canal, and as its contained matters are propelled against their gravity, such a receptacle is rendered prone to disease, because in it stimulating, irritating, and unwholesome ingesta find a remora, and thus a longer time is given for the operation of their noxious influence on its tissues. In this organ have been found large indurated concretions, balls of hard unaltered food, and foreign bodies, and Blackadder discovered in it an enormous quantity of worms, which had produced ulceration; and I have known it contain a vast number of cherry-stones. Morbid secretions poured into it from the ileum may cause such irritation as to deprive its muscular coat of its normal power of contraction, and hence an accumulation of its contents, augmenting its disease by mechanical pressure. In the same manner, from more general causes there may be a loss of propulsive power when large fecal collections give rise to acute enteritis; and it may here be observed that there is no part of the bowels so liable to inflammation as the cæcum, which may begin in its follicles and spread to the other coats, or it may commence in all the tunics at once. The vermiform appendix is sometimes the first to be inflamed, and when it is thus affected it generally contains some foreign body, the irritation caused by which is followed by inflammation; the lesion may be confined to this small organ, but it far more frequently occurs that its morbid condition is associated with the disease of other parts of the intestines.

Inflammation renders the cæcal pouch large; the contractility of its muscular tunic is diminished precisely as in intussusception, and with its enlargement is sometimes discovered displacement. Salzmann and Annesley record cases illustrative of the foregoing assertion. An example of cæcal enteritis came under my care some time ago which may here be aptly cited. A muscular, well-made man, thirty-seven years of age, was admitted into the Tunbridge Wells Hospital who had been employed as the driver of wagons in the construction of a railway; and on admission, the abdomen was distended; he complained of much pain in the bowels, which was increased upon pressure, and the pulse was small and

quick. He had been treated for obstruction, had had purgatives in repetition, but their administration was followed by sickness and vomiting. He lay on his back, with knees elevated, in great prostration; the breathing was thoracic, the pulse 130, small and compressible, the features were sharp and sunken, and the surface was bedewed with a clammy perspiration; the abdomen was tense and tympanitic, and there was general tenderness on even gentle pressure. He was treated in the ordinary manner, but the pulse became thready, the extremities cold, the respiration quicker, and he died on the following morning. Inspection showed the ileum to be in large inflated coils, which were injected, and not smooth and polished as in health; the serous effusion was considerable; the stomach was thrust high up under the diaphragmatic arch, and the left lobe of the liver was pushed towards the right side; the cæcum was very large, and lay in the left hypochondriac region; and it was united to the great omentum, colon, and ileum, by masses of organized and more recent lymph; and on being removed it seemed capacious as a stomach, and on being cut open contained a quantity of pulaceous, biliary matter; its mucous lining was dark and vascular, imparting a stained, port-wine hue to the villous coat, and this staining extended for six inches into the ileum, where it gradually shaded off, but at the colonic side this colouring abruptly terminated; and the ileo-cæcal valve was much dilated. When the cæcal parietes were examined between the fingers, they were tender, and readily lacerated; superimposed on the mucous surface was a semi-organized deposition of lymph, the submucous tissue being intensely injected, and this part of the bowel felt thick and coriaceous. This was an instance of all the coats becoming inflamed, the disease beginning in the mucous membrane.

Phlegmonous Inflammation of the colon may come on in a sthenic or an asthenic form; and when its accession is in the manner first named the various conditions which characterise the symptomatic fever are fully pronounced, there is great pain on pressure, frequently at the first over the cæcal region, which extends up to the right hypochondrium, across the epigastrium, and into the left iliac fossa, and if the rectum become affected, there is a feeling of heat or even burning down to the outlet of the bowel, and great aching over the sacrum. Tenesmus and vomiting are the general accompaniments of the complaint; at the outset of the attack the bowels may be acted upon two or three times in quick succession, after which constipation commonly succeeds. There is sometimes great straining at stool, when perhaps only a few scybala are voided, or a small quantity of biliary matter, and afterwards a sero-mucoid slimy defecation is passed, which is often to a greater or less extent streaked with blood, or it may appear to consist chiefly of blood. In some cases a biliary diarrhœa accompanied by irregular attacks of twitching and tormina ushers in the inflammation. When the disease supervenes upon a

state of foregoing ill-health, as the localization of mal-nutrition, by the arrest of the normal metamorphosis of the tissues, or from the retention of some noxious product generated in the organism, and which ought to be carried off by the emunctories, the constitutional disturbance is at the commencement indicated by the symptomatic fever, which, as previously remarked, is not the case when obstruction is the cause of the complaint. When the lesion has become fully established the distension is often very great, much flatus escapes, and there are generally repeated attempts at defecation with little, or it may be no fæcal matter being passed. In some instances the disease is continuous into the ileum, which is red and injected. Sometimes the peritoneum is first inflamed, and the muscular and mucous coats in consecutive order become affected, but such mode is far less common than the converse manner of its attack: when in the first-described way, it is generally as a complication in the morbid action of certain of the solid viscera, or in severe examples of peritonitis.

In the *Asthenic Type* the disease assumes more of the dysenteric character, its advent is more gradual, the febrile symptoms are more subdued, the flux and tenesmus are prominent signs, and the mucous membrane is primarily and chiefly affected; large red, raw-looking fungoid elevations of varied extent are located on this tunic, and under their morbid influence the peristaltic action of this part of the tube is so much exalted that it is often discovered quite emptied of its contents. In true dysentery as it prevails in inter-tropical countries, not only the colon, but also the cæcum, ileum, and rectum are very commonly implicated, and the peculiar odour of the dejections alone would almost distinguish it from simple inflammation of the large bowel. *Gangrene* is quite as liable to take place in this section of the canal as in the ileum. Sometimes after the acute stage has been marked with much severity there is a gradual declension of the complaint, and it ends by resolution, or passes into a chronic condition, the patient living for weeks or months and at length sinking by asthenia. There is then almost always ulceration, and occasionally there is rapid and fatal perforation.

Muco-Enteritis and *Sero-Enteritis* are not infrequently witnessed as the *complication* or *termination* of some other malady; they are thus seen as acute, sub-acute, or chronic affections, and their terminations exhibit very varied pathological changes. They may be produced by contamination of the blood caused by malaria, or from some primary vice in the depurating organs, or by the extension of the inflammation of the adjacent viscera and connecting tissues; and in remittent, continued, and eruptive fevers, the diseases of the mucous membrane, of the stomach and bowels, so often present such gravity and prominence, that it can scarcely be matter of surprise that pathologists have been led to regard the lesion of this structure as the real and fundamental cause of the entire train of febrile phenomena. And in protracted and exhaustive complaints superven-

ing upon some particular cachexy, as the tubercular, the glands and follicles of the intestines become inflamed, and thus true enteric inflammation may be established.

Gastric Inflammation may be extended to the intestines by continuity of surface and also by contiguity of position. In carcinoma of the stomach the mechanical pressure of the tumour not uncommonly produces a chronic, circumscribed enteritis, and hepatic affections are often seen in connection with either muco- or sero-enteritis. A redundancy of bile may bring on villous inflammation, which may terminate by peritoneal implication, by purulent secretion, or at length by ulceration, and in either of the two last-named eventualities pus may be transferred into the circulation and deposited in the hepatic viscus, and thus the two parts affected will react upon each other. The thickening and tumescence of the mucous lining of the hepatic ducts, which cause constriction or even imperviousness of those passages, often explains the occurrence of jaundice in enteritis, which is not an unusual accompaniment. Hydatid cysts are associated with this ailment, and writers on the diseases of tropical climates never fail to point out the correlation between hepatic abscess and enteritic inflammation. Acute hepatitis is frequently complicated with acute disease of the large bowel, and the liver and intestines are often welded together by masses of lymph. In splenic affections, as they occur in malarious countries, when the organ becomes immensely enlarged, its increased volume is apt to encroach upon the position of the bowels, and the mechanical irritation induced is sometimes followed by partial or more general inflammation of the bowels.

Enteritis as the complication of continued fever, and most especially of that particular form distinguished as enteric, is a subject which has been thoroughly investigated; Petit and Serres, Bretonneau, Louis, and Andral, were the earliest inquirers into this branch of pathology, and the more recent researches of British physicians have contributed greatly to the precision of our knowledge on the question. From the extreme frequency of intestinal disease being associated with this type of fever Petit called it entero-mesenteric fever, and from the inflammatory tumefactions of the follicles, which resemble an internal exanthem, Bretonneau named it dothin-enteritis. It is not in all cases of enteric fever that this pathological appearance in the small bowel is discovered; there may be only injection and softening, but as the rule the glands and follicles are morbid, and the lower third of the ileum is the part of the tube which is chiefly affected. Andral says this exanthema of the intestine, as he termed it, is not found in any other *acute* disease, and that Louis' experience coincides with his own. In pulmonary phthisis an approximate appearance obtains, the absolute difference of which will, when speaking on the morbid anatomy of the disease now described, be pointed out.

This affection of Peyer's patches and the solitary glands, accord-

ing to the best authorities, commences with the fever, or very shortly after its accession, and continues throughout its course; it is not always commensurate with the severity of the case, but it may continue after the subsidence of the pyrexial symptoms, and end fatally after an elapse of forty, fifty, or even sixty days from the commencement of the fever. The large bowel sometimes presents an erythematic colouring of the villous surface, which is most commonly seen in the cæcum, and the glands and follicles are enlarged as in the small intestine. In the colon these pustular-looking eminences are more sparsely scattered, and they decrease in frequency in a ratio with the approach to the rectum; and the submucous and deeper tissues in their vicinity become inflamed, and the evidence of very acute inflammation is sometimes observable. The mucous membrane is elevated in fungoid projections until they break up under the more advanced condition of the ulcerative process; the muscular tunic, after having become red and injected, diminishes by ulcerative absorption, and the peritoneal coat, now reached and subjected to irritation, is rendered vascular and inflamed. The abdominal surface of this membrane then effuses the ordinary products of serous inflammation; serum is poured into the sac, and coagulable lymph agglutinates the intestinal folds to each other, to the solid viscera, or to the parietes of the abdomen; and the peritoneal attack thus instituted may be localized or more generally diffused, and when thus co-existent with essential fever its type is of the asthenic description. Peritonitis is superadded to enteritis. When the mucous and muscular tunics are absorbed under the morbid changes described the serous coat may alone maintain the entirety of the canal, and any little stress upon this thin and fragile membrane, as a full meal, the pressure of an undigested morsel, the straining at stool, or some sudden exertion, is sufficient to effect its rupture when the secretions of the bowel and its fecal contents are extravasated into the peritoneal cavity, and fatal inflammation speedily comes on. The conservative efforts of nature are sometimes seen under this terrible accident; a plug of lymph for a while seals up the aperture, and it is even averred under such event that recovery is within the remote pale of possibility. In scarlet fever and measles the elliptical patches are rendered red and thickened, and in small-pox the enteric mucous membrane is sometimes much irritated and occasionally inflamed.

In *Phthisis* the villous surface of the small intestine is not infrequently found red and inflamed; the discoloration pervades varying extents of the membrane, and is then accompanied with thickening and softening. Sometimes purulent secretion is deposited in small collections, forming diseases in the submucous tissue. These conditions are followed by ulceration, and according to Louis, as in *essential* fever (in enteric), the lower third of the ileum, and more especially that portion nearest the mesentery, is the locality most commonly affected. The ulcerations are associated

with tuberculous granulations; at the morbid parts the muscular coat is often absolutely destroyed; and both Louis and Andral observe, when these ulcerations penetrate deeply, partial peritonitis occurs, the serous covering becomes vascular, inflamed, and besmeared with purulent effusion. The inflammation thus produced by irritative matters thrown out in the susceptible serous tunic affects adjacent coils of the tube, and ulcerative intercommunication may take place between two or more folds of the gut. It may be here remarked that there is not that liability to extravasation of the faecal contents which there is in fever, because in phthisis these morbid changes are the result of chronic disease, and the welding together of the intestines precedes the perforation. In Louis' cases there was inflammatory redness of the mucous membrane of the colon in one-fourth of the number he records. When ulceration comes on in the large bowel the stools are foetid, discoloured, and often tinged with blood. Simple inflammation of the enteric mucous membrane occurs in other chronic maladies than phthisis, an observation which is made by Louis and noticed by Andral. The glands and follicles of the bowels form one of the chief outlets to those effete and noxious materials which are generated in long-standing maladies, and which set up irritative inflammation. Mesenteric disease and dropsical effusion are very frequently, if it be not said always, the cause of enteric irritation; and Churchill says the symptoms which accompany enlargement of the mesenteric glands are not referrible simply to the condition of the glands, but arise from the intestinal disorder which so generally precedes and accompanies the affection; and the same remarks are applicable in the cases of young persons and adults as well as in children.

Pleuro-pneumonia, by extending through to the under-surface of the diaphragm, occasionally gives rise to enteric complication; and the converse may occur, inflammation of the intestines may become continued into the chest, and the pleura costalis, the pleura pulmonalis, and the lung substance be involved. In suppressed and retrocedent gout muco-enteritis comes on occasionally, and the diarrhoea, as Garrod observes, seems to ward off the arthritic symptoms. It sometimes comes to pass that the inflammation of some part of the tube is followed by permanent adhesion, or such alteration of calibre as to terminate in obstruction.

In speaking of this disease as incident to *Children*, there may be inflammation of the intestines during intra-uterine life, and Desormeaux and Billard give examples of this fact, and Stokes says in some infants who have died but a few days after birth unequivocal marks of chronic inflammation of the intestines have been discovered. In many of those instances in which diarrhoea and rapid emaciation immediately follow birth it is exceedingly probable that there has been congestion or absolute inflammation *in utero*. Billard gives particulars respecting ten cases of what he considered congenital enteritis, and of which the infants died on the first or second day

after birth. During lactation these little patients are, from the exalted sensibility of the alimentary canal, very prone to attacks of enteritis, which may be erythematic, and accompanied with alteration and a vitiated condition of the secretions, or it may be follicular, with disorganization. Various portions of the tube may be the seat of the disease; and according to Billard, out of eighty cases of infantile enteritis, in thirty there was inflammation of the small and large bowel, in thirty-six of the ileum alone, and in fourteen only inflammation of the colon. In very young children gastritis is commonly associated with enteritis.

In the discussion of this part of the subject it is of practical importance to bear in mind that no one symptom is pathognomonic of this disease in children, and that our diagnosis should always be formed from a survey of an assemblage of the signs, also that the morbid sympathies very commonly have reference to the nervous and respiratory systems, and that sympathetic irritation may pass into active inflammation as grave and well-defined as the primary affection; in this way the organic nervous chain may transfer morbid irritation to the cerebro-spinal centres and absolute arachnitis or cerebritis eventuate, or pneumonia, pleuro-pneumonia, or bronchitis be produced. Some authors assert that acute hydro-cephalus is mostly caused by the first conditions of disease being located in the enteric surface; and if such position be not in its entirety accepted, it is well known that bowel complaint and head affections often occur simultaneously. Abercrombie asserts that in young children it is very difficult to distinguish enteritis from the ordinary diarrhoea of dentition; and he attaches, as a distinction between them, great importance to the symptomatic fever. This, however, cannot always be depended upon, because there may be considerable fever during teething, and this symptom may exist in very modified and mitigated degree, when actual inflammation is present. The complaint most commonly comes on during weaning, dentition, and after exanthematous fevers. It is the opinion of some pathologists that weaning, debility, infantile remittent, and tabes mesenterica are directly traceable to inflammation of the alimentary canal, and there is no doubt that irritation in the digestive tract is very intimately connected with the affections above named, because the kind of phenomena presented and the appearances on dissection point to such conclusions.

The *Causes* of this disease in *Infants and Children* resemble those causes which give rise to the complaint in the adult. When we consider that, for the purposes of nutrition and growth in the young, digestion is necessarily a very active function, and that, in a ratio with the activity of office of any organ or organs, there is a proneness to disease, it becomes explicable that the mucous membrane of the alimentary tube is frequently the seat of lesion. During infancy the infant is greatly affected by any changes in the nurse's milk, which may be produced not only by the use of an improper

diet on the part of the latter, but from the condition of impaired health, or from mental influences. Whatever renders abnormal the lacteal secretion influences the digestive function of the babe, a fact so universally known as hardly to need mention here. During weaning, unsuitable food, and food given in excessive quantity, often bring on the ailment, also damp and cold, and sudden transitions of temperature. It is not uncommonly seen in infants that have been brought up by hand, and more especially in cities and in large manufacturing towns, where the poor are ill supplied with milk, and where they are compelled to live in damp and badly ventilated apartments; and in such communities it is mostly witnessed in the sub-acute or chronic form. Those causes which induce diarrhœa may induce enteritis, and indeed, as before remarked, it is an arbitrary distinction which professes to define a real difference between diarrhœa with inflammation and enteritis. Irritative ingesta, impure air, chills to the surface, dentition, purgative medicines in too large doses or too frequently administered, the exanthems, and the suppression of cutaneous eruptions are doubtless the most common circumstances which enter into the causation of enteritis in infancy and childhood; and that high degree of vitality with which the organism of the young is endowed, for the purposes of an increasing development, favours the progress of diseased action. The time of dentition is a period in which much general derangement of the various functions takes place, and amongst other changes the mucous follicles of the intestines are prone to become large and inflamed, when various extents of the villous coat and other tunics may assume the inflammatory condition. Bouchut discovered that only twenty-six out of one hundred and ten escaped without the mucous follicles being thus affected at that time, and that forty-six out of this number had disease of the follicles severely. Scarlet fever, measles, and small-pox are sometimes followed by inflammation of the bowels, because the glands and crypts are outlets for those effete and irritative matters which are carried into this channel for transfer from the system, and the erythematic redness pervades the mucous tunic.

The *Symptoms* of enteritis in *Infants and Children* are much varied in their onset; and in some cases the disease comes on gradually, but more frequently the attack is sudden. It is often at the first difficult to decide whether it be mere diarrhœa or inflammation; and it may commence in the former and terminate in the latter affection. The child does not play as usual; it is fretful and screams, is inclined to lie down, looks heavy and drowsy, is disposed to slumber, and when it does sleep it grinds its teeth, starts, is readily disturbed, and, as Dr. West observes, the eyes during its brief periods of repose are not entirely closed. The skin becomes hot, the cheeks flushed, the pulse quick, the tongue covered with a white or brownish fur, often dry and preternaturally red at tip and edges, and the lips are parched; and there is often intense thirst, and it con-

tinually cries for cold drinks, which are taken with morbid eagerness. These conditions may be preceded by loose bowels or constipation; but there is most commonly diarrhœa. The last-named symptom may have been present for several days, but it more usually comes on suddenly. There is then tumescence of the belly, with pain on pressure more especially of the umbilicus or the iliac fossæ, the diaphragm is thrust up into the thorax, and the respiration becomes so much accelerated as to simulate thoracic inflammation; the bowels may be moved five, or six, or ten, or even twenty times in the twenty-four hours, and when the diarrhœa is severe the irritation is extended to the stomach, and often there is distressing sickness. The danger of the case is by no means to be estimated by the excess of the diarrhœa, because it sometimes happens that the attack is rapidly passing on to a fatal issue when the bowels are not moved more than three or four times during the twenty-four hours, or, as Billard observes, when they act naturally. The dejections present very different appearances, as they are sometimes light and clay-coloured, entirely fecal, and occasionally are expelled with much force. In other examples they are green, or of yellowish or reddish brown colour, and watery; or they may be mucoid and gelatinous, and exhibit pieces of undigested food; and pus, false membranes, and blood in varying quantities are sometimes discovered. In grave and fatal cases the face becomes pinched, the eyes look sunken, there is great declension of the vital powers, as evinced by the pulse and the general appearance of the patient, and the emaciation often goes on with remarkable rapidity.

There are other facts which it is important to bear in mind. In infants at the breast the general symptoms may be far less pronounced than in childhood: the temperature may not be exalted, the circulation may not be affected, and yet absolute inflammation of the bowels may obtain; again, enteritis is often the cause of other affections, such as infantile remittent fever, mesenteric obstruction, and cerebral maladies. Its sympathetic influence is not uncommonly extended to the respiratory and nervous systems. The irritation, first existent in the digestive tract, may produce accelerated breathing, and excess of function may end in bronchitis or pneumonia; or the brain and its membranes may become inflamed. When distal organs thus become secondarily implicated, the remedies are often most successful when addressed to the primary seat of disease. When the inflammation extends from the inner coats of the intestines to their serous covering, the pain is more acute to the touch, the diarrhœa may be inconsiderable or absent, the pulse is small and thready, and there is great facial collapse. The acute attack of enteritis sometimes passes into the chronic form, when it becomes associated with changes in other organs and tissues, which are treated as superadded or distinct diseases.

MORBID ANATOMY.—With reference to the *morbid anatomy* it is often difficult to interpret correctly the results of disease in the

intestinal tube, and it requires an eye familiar with morbid appearances to define them accurately. In acute enteritis the mucous membrane is red and injected, and these conditions may pervade a great portion or only some part of the canal. The colour may vary from a pinkish hue to intense redness; it may be punctiform, striated, ramiform, in patches, or equally diffused. Though capillary injection is one of the cardinal characteristics of this inflammation, yet it is not always the result of the inflammatory process; it may be of a passive as well as of an active description, it may be of the first-named from irritation, or from distal obstruction, as when there is impediment in the cava or vena porta, or from dyscrasia, and post-mortem gravitation: when it is of the active kind, from inflammation, as Billard observes, the hyperæmia is seen in non-depending as well as in depending parts; it cannot then be traced backwards to venous obstruction, it is localized, there is softening of the tissues, and the exudative products are manifest. Bichat and Broussais believed that inflammatory redness might disappear after death, but such, as the common rule, is not the case; in slight instances the vascularity may be difficult of detection, and in mere irritation, or after erethism, the mucous coat may again become pale; but in absolute inflammation the capillary engorgement persists. The valvulæ conniventes and muciparous glands are most prone to vascularity; sometimes, however, the entire membrane is of an uniform blood-red colour, and this diffuse redness may be of great extent. Inflammation of the other viscera may, by revulsion, render the hyperæmia less apparent than it would otherwise have been; and according to Andral, the order of frequency in which vascularity obtains in the intestines is, first, in the lower third of the ileum, then the cæcum, colon, rectum, duodenum, upper portion of ileum, and jejunum.

With the progress of the inflammation other changes supervene; the submucous tissue becomes infiltrated, the disease extends to the other tunics, the intestinal walls look thick and hypertrophied, and they are readily lacerated. When the affection continues, the serous investment generally in greater or less degree becomes implicated, and such being the case, capillaries, which normally carry a clear fluid, contain red blood, the free surface of the membrane loses its polish, and lymph and serum are effused. When the villous coat is much inflamed, the redness is a prominent feature, and the portions affected are elevated above the healthy and surrounding structure; at some points minute spots of still deeper red are observable, in some of which ecchymosis had evidently occurred, and these effects of vascular rupture may be confined to the mucous membrane, or extend to the subjacent tissues. When there are patches of inflammation, the intervening spaces may be seen quite natural, and the borders of the diseased parts may be clearly marked, or insensibly shaded off into the normal colour. At the places of inflammation the villous tunic becomes abraded, and an excoriated, sore appearance is presented, and such raw-looking, denuded parts are covered with

an albumino-puriform or muco-puriform secretion, which may be in varying degree mixed with blood, or they may secrete a viscid, ropy, jelly-like mucus, or a thin, turbid, sanious fluid. In children the glands are very prone to become ulcerated. Not infrequently fungous elevations and nodulated eminences of spheroidal or conoidal form are observed, and in most instances they are smeared over with a glairy brownish mucus. Sometimes these vascular prominences become pedunculated. It occasionally happens that the plastic exudation assumes the concrete condition, and coherent membranous layers line the internal surface of, or are found free in, the canal, and these are sometimes moulded to the inner configuration of the gut, and exhibit the tubular shape, resembling in their mode of production the concretions of croup and membranous menstruation. By the property of a continuous tendency to secretion in mucous membranes, the albuminous constituent becomes diluted with mucus, and consequently it can with more difficulty enter into plastic forms, and by an admirable provision of nature, thus it is that passages invested with mucous membrane remain patulous. When enteritis is more obviously the expression of some foregoing and constitutional malady, the appearances after death are much modified; the plastic formations are less frequent and less tenacious, and there is a greater proneness in the parts to pass into the ulcerative change.

When the muscular coat becomes involved, it loses its power of contraction, the generated gases are not expelled, and thus we find, in the acute form, great distension, the walls being thin and tense; in some instances intussusception is discovered, arising from this dilatation of the gut, which has been caused by inflammation. At the seat of invagination the bowel substance looks dark and congested, and the serous coat generally exhibits the inflammatory products. In the more chronic cases thickening of the intestinal parietes is a common change; from the submucous infiltration a whitish organized deposit is formed of two or three lines in thickness, which pervades the tube so far as the inflammation extends. It confers the feeling of increase of volume and induration to the bowel; and Stokes says he has known it deposited from the pylorus to the anus. It may, however, be revealed with less uniformity, and in partial depositions, whereby the calibre is encroached upon, or absolutely obstructed. When there is an hypertrophous condition in the acute stage, the gut is often seen red and tumid and soft, the mucous coat is readily detached from the underlying tunics, and the filamentous texture is surcharged with serum. In speaking of these morbid alterations, Stokes very justly observes that, as the rule in chronic enteritis, there is hardening of the tissues of the bowel, and in acute enteritis softening of them.

When the complaint occurs as a secondary affection, as it does in typhoid fever, tuberculous phthisis, dysentery, tabes mesenterica, and infantile remittent, the glands and follicles are found affected;

at such points the mucous membrane swells, becomes red and dry, and then it is covered with a ropy mucus; in the gut are seen copious accumulations of sero-gelatinous secretions, and sometimes hæmorrhagic effusions. The underlying cellular tissue is in some parts swollen and raised, at other places a superficial slough has been thrown off, and ulceration established. In enteric fever these changes are far more frequently discovered in the lower part of the ileum, and within twelve or twenty inches of the ileo-cæcal valve, and in dysentery in the cæcum and colon. When the glands and follicles are much inflamed, and in greater degree than the other parts of the mucous membrane, they are surrounded by a vascular halo of dark-red colour, are raised up in conical nodules, and by the tumescence the orifices of the follicles become closed. In the more chronic condition the general lining of the bowel at the portions diseased assumes a rusty brownish red, it looks slate-coloured, or it may be of a black appearance; but the last-named state should not always be regarded as the measure of the duration of the disease, because its presence may be dependent upon a greater or less amount of carbonaceous matter. The isolated follicles may be found inflamed alone, or in association with the inflammation of the aggregated follicles. They are seen as small fungoid bodies, resembling variolous pustules. Small abscesses are formed at these glandular and follicular points, then ensues loss of substance, and the continued excess of secretion at length produces paleness of the inner surface of the bowel. In children follicular ulceration is most seen in the lower part of the ileum and in the colon.

When ulceration has extended into the filamentous and muscular coverings, the serous investment is rendered tumid, red, and injected, sero-albuminous fluid is effused upon the free surface of the peritoneum, it irritates other portions with which it comes in contact, and thus circumscribed or diffuse peritonitis, with the ordinary plastic adhesions, sero-albuminous, sero-purulent, or sanguineous effusions may be superadded to the enteric inflammation. It is sometimes, as before spoken of, discovered that two or more coils of the intestines, which have become agglutinated by lymphic deposition, are perforated by ulceration at the places of juncture, and intercommunication effected. In other instances the perforation is such as to admit of immediate extrusion of the intestinal contents into the peritoneal cavity. When enteritis has long subsisted, the mesenteric glands are not infrequently, more especially in children and those of the tuberculous cachexia, found large and inflamed; and when the disease has chiefly affected the large bowel, extensive patches of the mucous membrane, especially about the sigmoid flexure, are absolutely destroyed. In gangrene the morbid appearances are very varied; the mucous membrane may be of a whitish yellow colour, dry and rotten, and readily breaking between the fingers, or it may be of a uniform black colour, and a moist, pulpy, shreddy mass, the muscular coat being soft and resistless. When there is sphace-

lation of the villous surface, the external aspect of the bowel exhibits a bluish or dark-brown colour, and in those instances where there has been obstructed circulation, as in intussusception and hernia, the colour is dark-brown or blackish green, and all the tunics are soft and friable. A peculiar and offensive odour characteristic of gangrene is evolved.

DIAGNOSIS.—The physician whose knowledge is founded on experience rather than upon the literature of medicine is aware that nice distinctions in forming a *diagnosis* of the diseases of the abdominal viscera cannot always be attained; but there are some differences which it is needful to hold in view. Enteritis is distinguished from *colic* by the rigors, quick, and at the first hard pulse, hot skin, white tongue, with erect papillæ and red edges, and tenderness on pressure. This tenderness is not so intense as that of peritonitis, but it is felt when pressure is applied. In colic the pain is relieved, in enteritis it is increased by pressure; in the former the attacks are paroxysmal, and during the intervals there is freedom from suffering, and although in the latter there are fits of augmented pain, yet it does not subside: it continues a dull and an abiding pain. The patient lies on his back, with knees up; he carefully keeps the trunk in one position; he cannot twist and turn as in colic; the breathing is thoracic; sickness, vomiting, and diarrhœa supervene; the stimulant remedies which relieve colic are often injurious in enteritis, and the seat of pain is often at the navel, the hypogastrium, or the iliac fossæ; and with the progress of the complaint the pulse becomes smaller and the features sunken. The condition of the stomach and bowels is most important in judging of the disease. In *Lead-Poisoning* the pain is colicky, the bowels are confined, the gums present a blue line, the fore-arms drop, and the history of the case points to the nature of the malady. When *Hysteria* mimics this affection the case generally occurs in a young and an unmarried woman; upon inquiry it will be found that she has been subject to hysterical attacks, and often that the uterine functions are at fault. When the pain is said to be seated in some particular part of the abdomen, the merest touch, or even pinching up of the skin, is complained of as productive of exquisite tenderness, and is far less readily borne than positive pressure. A negative proof consists in the absence of the common signs of inflammation, and the symptoms are incongruous and contradictory.

In *Hernia* the disease comes on suddenly, and examination readily decides the question. When from *Intussusception*, which may be as a consequence of inflammation, from the bridling or partial adhesion of the bowel, or from a loss of its contractility, absolute obstruction, sickness, and stercoraceous vomiting denote the real gravity of the case. Constriction of the gut, by some ancient band of lymph, a twist of its folds, the blocking up of its passage by a concretion, a gall-stone, an undigested morsel, or indurated fæces give rise to the same symptoms. It has before been

mentioned as the observation of Barlow that in instances where the obstruction is near the gastric end of the tube the secretion of urine is greatly diminished, and when it is in the lower part of the canal its quantity is little, if at all altered. It should be borne in mind that the shock which is given in ileus and sudden obstruction may be such as to prevent the development of the pyrexial phenomena, and the patient may sink by asthenia. When percussion can be employed, before the peritoneum becomes involved, it confers much accuracy to our diagnosis, especially where there are fecal impactions, tumours, and other causes of obstruction. The dejections are always to be noticed. When pieces of undigested food pass mixed with fecal and other matters the ileum is the seat of lesion, whilst serous, sero-purulent, and sanguineous stools indicate the active and more advanced condition of the villous disease. Albuminous flocculi and membranous concretions may come from the small as well as the large bowel. Excess of mucus and mucopuriform secretion show the glands to have been inflamed. If the evacuations are mixed with red blood, such generally comes from the colon or rectum. In ulceration of the great gut, the ordinary fecal odour is absent, and the diseased products are often mixed with small amounts of feces. In children diarrhœa (when the stools are green and bilious, or light, yeasty, or aqueous) not infrequently ends in enteritis, which is characterised by pyrexia, pain on pressure, and sometimes cerebritis or meningitis is superadded. When the duodenum is inflamed there is generally gastritis, great sickness, diarrhœa not being always the accompaniment, and icterus often comes on. In tropical countries hepatic disease is apt to be associated with enteritis. When the affection is the complication of enteric fever the history of the case and a review of the febrile phenomena will be our guide. In dysentery the morbid secretions precede the inflammatory signs, the tenderness is confined to the course of the colon, and tenesmus is a prominent symptom. Peritonitis runs a more rapid course, the pain on pressure is far greater, and as the rule there is constipation. In ischuria renalis there is pain in the back which shoots round and into the groins, and the urinary secretion undergoes morbid changes. When it is of gouty origin, the previous ill-health and the indication of that diathesis show the cause. When enteritis is the local expression of some general taint, of some peculiar cachexia, its symptoms are of the sub-acute order, more masked, the albuminous product is effused in less quantity, and there is great proneness to glandular inflammation. In gangrene there is much declension of vital power, great diminution or entire absence of pain, excessive tympanitis, singultus, syncope under exertion, breathlessness, small, irregular, and thready pulse, relaxed sphincters, sunken features, and cold extremities.

PROGNOSIS.—As pertaining to *prognosis*, the circumstances which indicate a favourable termination are a more natural condition of the bowels, abatement of the sickness, less pain on pressure, subsidence

of distension, more equable heat of surface, with returning moisture, first at the flexures and then over other parts of the body, a larger, more regular, and slower pulse, the tongue is clearer and not so dry, the respiration is easier and not so thoracic, and the face is less sunken and more natural. After these sure signs of improvement, other conditions of amendment follow; there are lateritious deposits in the urine, the appetite improves, and the patient can turn on his side, and extend the legs without inconvenience. When the case is unfavourable, the sickness and diarrhœa continue despite of all remedies, the stools are mainly of mucus or mucus mixed with feces, a brownish tenacious ropy jelly-like matter may be voided, or the dejections be sero-purulent or sanguineous. The pain on pressure is more exquisite, the surface is harsh and dry, the mouth and lips are clammy and parched, the distension increases, singultus supervenes, the pulse is small and compressible, the legs and hands become cool, and the hippocratic countenance is more striking. In children, the above remarks are in a great measure applicable; the more natural state of the bowels, slower respiration, and more tranquil sleep are cardinal signs of improvement—and in these little patients, when cerebral or pulmonary complication supervenes, their case is mostly fraught with much danger. In those examples of enteritis which can be ascribed to mechanical obstruction the prognosis is always most unfavourable, and in such instances as pass into the chronic form, when there is ulceration the convalescence is long and tedious, and the eventualities and termination can never be prognosticated. When there are effusions into the sac of the peritoneum, or enlargement of the mesenteric glands, and when the disease has been consecutive on some other ailment, the recovery is slow and protracted.

TREATMENT.—The proper *treatment* of enteritis greatly depends upon a correct conception of its cause, and the kind of pathological changes which subsist. When it is primary and in a person of robust constitution, when it is the complication or sequela of some foregoing malady, or when it arises from mechanical causes, the remedies will essentially differ. The first indication is to subdue the inflammation, then to arrest excess of peristaltic action, and, lastly, the secretions should be corrected, the excoriated and ulcerated portions rendered less irritable, and the absorption of effused products promoted. It rarely happens that general blood-letting is demanded; in sthenic cases local bleeding will mostly suffice; a dozen, twenty, or thirty leeches may be applied to the seat of pain; a large warm linseed-meal and bread or bran poultice may be spread over the whole abdomen. Latterly the use of cold has been advocated, which has been applied by means of wet compresses or a bag of broken-up ice being laid on the abdomen. It would seem that the patient's feelings form a good index to its employment. If the cold feel gratifying, it is said it does good; if it be unpleasant to the patient it should not be continued. Calomel, or grey powder, and opium should at intervals be given;

indeed, upon this remedy our main reliance is based. Poppy-head fomentations, terebinthinate epithems, and large sinapisms are often followed by signal benefit. Injections with thirty, forty, or even sixty drops of laudanum in two or three ounces of starch gruel, or suppositories with solid opium or morphia, are invaluable aids where there is much pain, and especially when there is urgent tenesmus. Some physicians recommend, in the early and acute stage, the use of antimony, but in this complaint antimonial preparations are very questionable and generally objectionable. When the diarrhoea is excessive it should be restrained, because it is desirable to diminish the afflux of fluids to the bowels, and this can be best accomplished by chalk mixture, in combination with catechu, or kino, or bismuth, and laudanum. Nor is it well to suddenly or entirely stop this symptom, because the secretion often relieves the inflammation. It is good practice to apply a broad flannel bandage to the abdomen, which keeps up an equable temperature, and the moderate pressure supports the viscera. Some authorities suggest the desirableness of a full suit of flannel. The vomiting may be combated by hydrocyanic acid, creosote, mucilaginous and bland drinks, iced water, or iced brandy and water. Effervescing draughts with the bicarbonate of soda or potash, or the sesquicarbonate of ammonia, with citric acid or lemon juice, are occasionally prescribed, but the neutral salt thus produced augments the peristaltic action, and the evolution of fixed air increases the distension, hence they are often objectionable. A mustard cataplasm, or a small blister to the epigastrium, will not infrequently mitigate this symptom. When there is no sickness the skin should be acted upon by ipecacuan, or the solution of acetate of ammonia with camphor julep.

When there is constipation instead of diarrhoea, or when the bowels are irregular, and only small amounts of faecal matter are passed, a small dose of castor-oil with a few minims of laudanum, or some of the neutral salts with the infusion of senna, and alternated with opiates, constitute an old but effective treatment. Small doses of magnesia in some aromatic water are considered to diminish the flatulence, and with the same object the compound galbanum pill by many has been commended. When the signs indicate inflammation of the peritoneum the treatment is that of peritonitis. In the subacute and more chronic examples vesication by means of a large blister, or smaller blisters, and repeated, and by the acetum cantharadis is a potent remedy. Blisters are generally inadmissible when the skin is hot and the pulse full. The ammoniated and terebinthinate liniments, when friction can be borne, are of service, and when an alterative action is required the mercurial liniment is very beneficial. In glandular and follicular enteritis the mercury and chalk and compound ipecacuan powders, or small doses of ipecacuan and rhubarb should be administered, and opiates will be required. In dysenteric types of enteritis the medicines given in dysentery should be rendered available, and most especially ipecacuan, which may be given in the simple

powder in such doses as the stomach will bear; and when it is the concomitant or sequel of enteric or exanthematous fevers, of renal disease, or dyscrasial change, the primary affection should be sedulously regarded. In infants and children calomel, grey powder, ipecacuan, warm-baths, fomentations, emollient enemata, and opiates are the leading remedies; and the physician should ever bear in mind the utter care which is required in prescribing any preparation of opium for infants and children. Perhaps the compound tincture of camphor is the safest mode of giving it; whilst the syrup of poppies is the most uncertain in its strength. When blisters are applied to infants a piece of silver tissue paper should be interposed, and the vesicant should only remain on two or three hours. The acetum cantharidis, which can be diluted, or the tela vesticatoria are very convenient; and stimulating and counter-irritant liniments, mild laxatives, cod-liver oil, preparations of iron, and when the mesenteric glands are enlarged, iodine are generally needed during the stage of amendment. The nitrate of silver, and zinc and tannin, are valuable agents when convalescence has more fully commenced.

In all cases absolute rest in the horizontal position, with well-regulated warmth, are imperative; the bed coverings should not be too heavy, and such articles as the eider-down quilt are convenient for being used as coverlets.

DIET.—The most rigid injunctions should be given respecting diet, which should be light, nourishing, and non-stimulating; sweets and condiments ought to be forbidden, and all such things which might not be digested or cause sickness. In the acute attack it is hardly necessary to observe that animal food and all solids are inadmissible; farinaceous articles, such as Indian cornflour, rice, groats, or arrowroot, tapioca, and panado, with milk or broth may be taken; strong beef-tea or Liebig's extract are always eligible. Milk should as the rule be suggested, and if it were likely to disagree a little lime-water should be added to each quantity given. Jellies and soups of various kinds are most proper for the patient; but the latter ought always to be strained through a fine sieve and made without vegetables, as it is of the greatest consequence that no part of the bowels should become inflated or rendered irritable. During more advanced convalescence fish, soft-boiled eggs, chicken, game and potted meats may be permitted, and an injunction should be made on the patient to be careful in the selection of his diet after the practitioner shall have ceased to attend. Sherry, marsala, claret, and weak brandy and water are preferable to malt liquors. Change of air always aids in the full restoration to health.

VII.

ULCERATION OF THE BOWELS.

DEFINITION.—Ulceration of the bowels is a secondary or consecutive, and not a primary affection; it occurs at all periods of life; it may be the accompaniment of acute, but it is far more commonly the concomitant or sequel of chronic disease; and any section of the digestive tube may assume the ulcerative condition, but some parts have greater tendency to this morbid change than other parts. The ileum and colon are equally prone to the affection, but it is far more usual to find both the large and small intestine ulcerated when this complaint is present. The ulcerations are very varied in extent, and they nearly always, if it be not said uniformly, begin in the glands or follicles. In the duodenum the glands of Brunner are apt to take on this process after severe burns. The complaint is most frequently observed in connection with enteric fever, phthisis, long continued diarrhoea, dysentery, infantile remittent fever, and as the result of hypercatharsis; it may eventuate in a limited or localized manner, as in stricture of the intestine, impacted faeces and concretions, by the mechanical pressure of the solid viscera when they are morbidly enlarged, by tumours, and by the various forms of cancerous deposit found within the abdominal cavity. The destruction of the inner tunics is sometimes followed by perforation of the serous coat, when speedy and fatal peritonitis succeeds. The process may begin from without inwards, that is, commencing on the serous surface when there may have been canulous or more direct communication with an ovarian tumour, the urinary bladder, some portion of the intestines, stomach, or gall-bladder; or retro-peritoneal abscess may cause ulceration of the bowels. Haemorrhage is not an uncommon result. And the affection about to be more fully considered may obtain, cicatrise, or no trace may be left behind. The diagnosis and treatment can only with correctness be determined by a right conception of the antecedent or primary complaint.

REMARKS.—That the digestive mucous surface should be much more proclivous to ulceration than any of the other mucous surfaces, can be understood when we contemplate its anatomical peculiarities and the functions it has to perform; and if a comparison be made between it and the bronchial membrane the causes of the tendency of the first named surface to the ulcerative state, and the comparative

immunity of the latter from that condition, become explicable. The gastro-intestinal membrane is everywhere abundantly supplied with glands or follicles, which are very vascular, and which are endowed with great activity of function; and, like other organs whose functions are active, they are correlatively liable to assume pathological changes. Physiologists have maintained that one of the chief offices of the solitary and agminate glands is that of eliminating decomposed and noxious matters from the circulating fluids; hence the irritation conferred to them and the institution of their inflammation. The process of digestion requires a large and continuous supply of mucus, and the arrestment or excess of this secretion is soon followed by morbid phenomena in the muciparous glands. The bronchial membrane possesses mucous glands and excretory tubes, but they are not depurative like those of the intestinal tract, and but little mucus is needed for the respiratory function. Inflammation of the bronchial lining is very readily succeeded by excessive secretion, but not commonly by ulceration. As it will hereafter be shown that some parts of the bowels are far more liable to the disease now described than other parts, it will also be insisted upon that the ulcerative tendency is in a ratio with the numerousness of the glands proper to the portion affected.

All mucous membranes are liberally supplied with blood, and as all organs and tissues which are highly vascular are prone to inflammation, it is thus that the inner tunic of the alimentary canal so often exhibits the result of the inflammatory process, namely, ulceration. An inflamed mucous membrane presents characters varying not only according to its situation, but also according to the causes by which it is produced, and in like manner is the ulcerative state modified. That ulceration of the bowels in its ordinary acceptance should mean the location of this disease in the inner tunics is a conclusion arrived at not only from observation and experience, but it can be accounted for as the result of certain pathological laws which influence and determine morbid phenomena in the various tissues and organs of the body. The serous membranes when inflamed exhibit the marked disposition to give off those adhesive or plastic materials whereby agglutination is affected, and this natural property is conservative of life, more especially when the complaint is in the abdominal viscera. And by a wise provision of nature, when the canals and cavities which are lined with mucous membranes assume inflammation, it is of the suppurative or non-plastic description; for had it been otherwise the accretion and union of the inner surfaces of such canals and cavities must necessarily very often have been followed by fatal consequences; and suppuration in this structure very commonly passes into ulceration.

ETIOLOGY.—The *etiological* conditions productive of this affection, save in exceptional instances, are not direct and immediate, but as the rule of remote and distant origin; and certain states within the organism itself; such as the relaxed and lymphatic constitution, the strumous diathesis, and a want of power in the assimilative

functions, are unquestionably predisponents. Lesion of vital energy, and a debased and deteriorated state of the blood and general secretions, are antecedent changes which are frequently followed by this ailment. When poisonous substances have been taken, or hypercatharsis by an overdose of purgative medicines has been produced, the disease now spoken of may at once succeed; but in the great majority of cases the elements of its causation are to be sought for in those conditions or agencies to which the foregoing or primary complaint is referrible. If cold and damp, low, humid situations, and vegetable and animal miasms are to be instanced under this head, it is because they give rise to those febrile phenomena and that general blood contamination, which constitute essential forms of morbid action, and of which ulceration of the bowels is but a concomitant or sequel; and hence it is that causes which engender enteric fever, phthisis, diarrhœa, dysentery, remittents, and some other affections are to be regarded as the causes of intestinal ulceration.

Various chronic maladies, such as Bright's disease, cirrhosis, splenic enlargement, cancer, and perhaps syphilis, are to be named; and doubtless pyæmia and similar other ailments might also be here instanced. Decayed fruits, decomposed animal food, and other septic articles of ingesta have been enumerated, but their pernicious influence is first exerted upon the chyle and circulatory fluids, whereby foregoing and general effects are generated in the system, and the intestinal malady is the indirect and consecutive event; and the same observations apply when the water of streams, tanks, or wells used for drinking and culinary purposes, has been polluted by animal and vegetable matters in a state of decomposition. In tropical countries, where dysenteric affections, cholera, and remittent types of fever prevail and are endemic, such are doubtless often the remote but prolific causes of this kind of ulceration. Telluric emanations in more subtle and less cognizable form, both as impalpable and impalpable gases and molecular atoms, there are good grounds for believing, are absorbed into the system, where they increase and germinate by elementary combinations, or multiple genesis, until the entire fluids of the organism become contaminated, and under such morbid operations the excretory organs of the lining membrane of the alimentary canal constitute a great and chief channel of elimination for the poisonous products and effete matters, precisely as when the more obvious and explicable agencies have been the cause, and thus this lesion is a common consequence.

In severe attacks of summer diarrhœa, when the biliary organs have been stimulated to excess of function, and a large quantity of acrid bile is poured into the bowel, such irritation to the mucous corion may be conferred as to give rise to inflammation, which may eventuate in the ulcerative change. In acute and chronic examples of disease, as in enteric fever and phthisis, where there are increased oxidation and enormous tissue-waste, the intestinal excretory outlets very commonly assume ulceration. In infants and children bad milk and

improper artificial food are fertile causes of chronic irritation on the digestive surface, which is at length followed by the bowels being ulcerated. When mechanical obstruction is the cause the history of the case and the attendant symptoms point to the etiological conditions. Indurated scybala and gall-stones are sometimes seen to institute the disease; and I have witnessed large patches of the colon ulcerated from the first named cause, and this process may with such an origin go on for a very long time, undermine the health, and be accompanied with all the outward and visible signs of organic disease. When the ulceration proceeds from without inwards, from the serous to the inner coats, the cause of the affection will then generally be attributable to chronic enlargement of the solid viscera, or to carcinomatous deposition.

SYMPTOMS.—The *symptoms* are always much modified by the kind and duration of the primary disease, by the part of the tube which is affected, and the amount of vital power possessed by the patient. It is important, in order to ensure their correct interpretation, that the history of the malady should be ascertained and the co-existent conditions be rightly understood. The degree of severity of the disease can be estimated by no single indication, nor is any particular symptom pathognomonic of the complaint; the local and general symptoms must be had in review together; and it must be held in remembrance that sometimes the ulceration is deeper and graver than by the indications we are led to suppose. Again, as Abercrombie has remarked, mere irritation may be mistaken for, or confounded with, more serious conditions. In enteric fever, when the great nervous centres are potently influenced, and in the latter stages of certain chronic ailments, when the sensorial functions are subdued and the sensibility becomes blunted, the symptoms of local pain may be so masked and obtunded as to be rendered almost wanting. It must be borne in mind that this symptom, pain, which is such a prominent and cardinal indication of pathological action in the organs and tissues generally, is by no means such a common attendant and correlative index in disease of the intestinal mucous membrane. According to Baly, sometimes in the worst cases of dysentery, which go on to destructive inflammation, abdominal pain is not complained of throughout the whole course of the disease. When the serous covering of the bowels becomes inflamed, pain at once sounds the tocsin of alarm, and by its acuteness and persistence the degree and nature of the lesion can, as the rule, with much certitude be inferred; but the digestive surface may be gravely inflamed and assume absolute ulceration when the symptom in question has never been marked, when even pain on pressure has been but very insignificantly elicited, and when it has in no wise corresponded with the progress and amount of the malady. The looseness and free surface of the inner intestinal covering, the thick and less dense structure of the cellular coat of the intestines, which forms a nidus for vascular ramification, and the state of frequent capillary distension caused

by the stimulus of digestion, may chiefly account for this peculiarity, but it is a fact of practical importance.

The alvine discharges exhibit very varied characteristics, and they should always be carefully inspected, as from their particular conditions significant deductions can be derived relative to those pathological changes which obtain, and more especially when such changes are going on in the large bowel. So much consideration has been given to the different appearances of the dejections that some nosologists have endeavoured to classify affections of the bowels according to the states which the stools present: but this was a faulty mode of classification, because neither the extent, the severity, nor the locality of such affections can thus be ascertained, and examination after death does not uniformly bear out conclusions formed by such means of diagnosis. Diarrhœa and hæmorrhage and sero-purulent and muco-purulent secretions constitute weighty facts in the scale of evidence, and pronounce with much certainty the existence of intestinal disease; but their absence, and even the natural appearance of the stools, do not prove the converse, that is, the non-existence of disease. Abercrombie says the condition of the evacuations is not in every case to be relied upon; and it is well known to all physicians who have paid attention to this subject that grave and deep ulceration of the intestines may be present when the dejections are fæculent, and to all appearance healthy. Louis, Andral, Tweedie, Wilks, and other authorities assert that even in enteric fever—that complaint in which ulceration of the ileum is such a constant and prominent condition as to be deemed pathognomonic of the ailment—this morbid change may be present when the bowels are confined, and that it may even end in absolute perforation without diarrhœa ever having been produced.

Ulceration of the small bowel is much less easy of detection by the stools than it is when located in the colon, and the cause of this fact can at once be comprehended. The natural contents of the ileum are of course perfectly liquid, and it is not until they pass into the cæcum and ascending colon that they assume consistence. The morbid products become so mixed and blended while the contents are fluid as to prevent recognition. There may be ulceration in the upper third of the ileum, and not only in such case may the stools give no indication whatever of disease, but such may give rise to emaciation, general loss of power, and death eventuate when no other post-mortem revelations can be discovered. In lenteric diarrhœa pieces of undigested food point with much correctness to the part of the tube which is the seat of lesion. In ulceration of the colon the morbid products are not in like manner incorporated, and as the rule they can at once be observed.

When the ulceration is limited to the sigmoid flexure and the rectum, it is not uncommon for diseased discharges to be at first voided without any admixture of fæces, and masses of scybala will then come away which have been formed in the transverse portions of the large gut. It

is also of importance to bear in mind that ulceration of some particular part of the digestive surfaces may set up irritation, extending through the entire canal by which the consistence of the whole amount of faecal matters may be materially acted upon, and hence, notwithstanding the significance usually given to such consistence, it is not to be implicitly depended upon either as to the precise seat or real nature of the malady. When there is ulceration of the large bowel thin, watery, and acrid evacuations are very usually observed, there is generally much tenesmus, and often glossy mucus, tinged with blood, and the patient will complain of cutting or twisting pains extending from the umbilicus through to the sacrum, and of heat and burning down to the anus. When the disease goes on to a chronic form it may assume the dysenteric character, when the faecal matter of the evacuations becomes intolerably offensive. Colourless, mucoid, or puriform dejections are often associated with extensive denuded, inflammatory patches in the large bowel, and their presence is generally significant of grave and established disease.

In *Enteric Fever* the abdomen is distended and resonant, and pressure at the right iliac fossa produces pain which is generally accompanied with gurgling. When the mucous tissue is alone ulcerated the pain may be trifling, or even it may be absent, because mucous tissues, even when inflamed, possess but little sensibility. When the destructive process extends to the muscular coat the pain is sharper, spasmodic, and often more or less paroxysmal, and if it implicate the serous covering it is then rendered acute, persistent, as in ordinary peritonitis. When the nervous system is affected, and there is stupor, this symptom is much obscured, and very imperfectly pronounced. When this fever occurs in children the head symptoms often mask the evidences of abdominal lesion, and the stools are frequent, and characterised by their fluidity and the absence of bile, and they are often ochre-coloured, very offensive, and of ammoniacal odour. Sometimes they are like pea-soup, sometimes they are dark, resembling coffee-grounds; occasionally they are light, floating, frothy, and as if in a state of fermentation; and on close inspection morsels of undigested food may generally be discovered, and on more minute examination pieces of sloughs, epithelial scales, and blood corpuscles can be detected. Murchison says diarrhoea may be absent when the ulceration is most extensive, but such instances are doubtless very exceptional. There is no other acute disease in which ulceration of the ileum occurs. There may be a very large extent of ulceration when the attack of fever is of mild description; and this lesion may be exceedingly limited and comparatively trifling, when the general febrile phenomena are most grave and death ensues. When perforation eventuates flagrant and fatal peritonitis rapidly follows; the mortal issue may be in three or four hours, but it mostly happens within forty-eight or seventy-two hours; sometimes, however, the patient survives the event for a few or even several days, but such are rare examples; and it may come on when convalescence

is far advanced. I have known the bowel from this cause perforated in the seventh week after the accession of the primary fever. It may take place in the ileum, cæcum, or colon, but it very seldom occurs in the last named part of the bowel. Intestinal hæmorrhage is sometimes produced by this form of ulceration. Murchison remarks, it may be in all quantities, varying from a few drops to two or three pints; in some cases the effused blood renders the stools dark and grumous; and in other instances the sanguinary fluid is voided red and arterial. The erythematic enteritis of children is often complicated with hæmorrhage from the bowels in the form of a sanguineous exhalation caused by an afflux of blood in an inflamed mucous membrane, and the quantity passed is sometimes large, but the negative facts will distinguish such cases from those in which the foregoing affection is enteric fever.

Ulceration of the bowels in *Phthisis* is a very common event, and diarrhœa its constant and most characteristic symptom. It is a morbid change which does not generally take place until the second or third stage of consumption, but in some few instances it commences still earlier. Sometimes the first condition of intestinal disease, as evinced by tubercular deposits in the submucous tissue becoming soft and broken up, is coëtaneous with, or even precedes, the pulmonary lesion, and then the ulceration now considered renders diarrhœa almost an initiatory, instead of a later symptom. Louis met with ulceration in five-sixths of his cases, and Bayle in sixty-seven hundredths of his examples. It is generally observed in phthisical patients, whose digestive organs are usually impaired, and whose assimilative functions are abnormally performed, that the intestinal mucous surface is at the beginning of the primary distemper morbidly irritable, and that even mild aperients will often be followed by unwonted and excessive action, the consequence doubtless of that incipient follicular disease which is produced by the elimination by the follicles of effete and noxious matters from the blood. Louis says, between the symptoms of diarrhœa and ulceration there is always an exact correspondence. The earliest symptom of this destructive change in the bowels is their increased action; and such increase of action is generally accompanied by heat of surface, colicky pains which are more or less severe, and it may be with some tenesmus. Abdominal pain is not, however, an indication upon which much diagnostic reliance can be placed, because the belly may be soft and pressure give scarcely any pain even when extensive ulceration exists. The motions may be voided with only a slight preceding or accompanying twinge in the bowels, or without any uneasiness whatever.

I recently had under my care a patient who for five months passed one or two large semi-liquid or pultaceous stools in the twenty-four hours, and who hardly ever complained of any pain in the abdomen. The diarrhœa may be continuous or remittent; when the former occurs the ulcerations are mostly large and numerous; when the latter obtains these lesions are small; the symptom is

rarely constant until towards the close, and sometimes it does not come on until a few days before death. Though Andral asserts that diarrhœa in a phthisical patient may, and for long, be present without intestinal ulceration, and he gives an example said to be confirmatory of this statement, yet the recent and more accurate investigations of morbid anatomy render such assertion doubtful, and certainly, if true, such instances are most exceptional. Craigie declares that when diarrhœa has long continued in this disease there is always ulceration, and my own experience coincides with this view. The purging is the most trustworthy indication. Of one hundred and twelve cases recorded by Louis only five were exempt from it; in the majority it commenced in the second half of the disease; in the fourth part it began from the twentieth to the fiftieth day before death; and in some of the more protracted cases it lasted from one to twelve months. When this symptom sets in the emaciation is marked and rapid, the patient is said to melt away under it, and hence the term *colliquative*. It is maintained by some writers that the diarrhœa is vicarious of the perspirations, and if such declaration is not to be fully accepted it is certainly often observable that after its advent the surface becomes drier and harsher, and I have remarked, when the purging has been an early and protracted symptom, that the perspirations have been inconsiderable.

It frequently happens, as I have seen in some late examples, that the flux—on the principle of revulsion, it is presumptive—relieves the pulmonary symptoms; the cough is less urgent, the expectoration diminished, and the feeling of constriction and oppression on the chest is not so great; the respiration, however, is not usually in like manner benefited; it remains accelerated, because the general weakness is more pronounced. The tongue is often preternaturally red and clean, and the papillæ are large and elevated; sometimes it is furred, and red at the tip and edges, and towards the close it becomes dry and brown; the evacuations are yellowish or bilious, sometimes aqueous and curdy, and sometimes small lumps, which are partially digested pieces of food, are mixed with a thick yeasty or pultaceous semidiffluent mass; the smell is often sour, in other instances the odour is most offensive and like that emitted from decomposing flesh; when the ulceration is iliac the morbid products are so blended with fæces as to be difficult of detection, and when colonic ulceration is also present blood and mucus are more frequently discernible. When perforation occurs the superadded symptoms resemble those above described as following that accident in enteric fever, but they are not so intensified and acute; the effused products cause the union of the bowel either to another coil of the intestine, to one or other of the solid organs, or to the abdominal walls; and thus extensive and diffused inflammation of the serous covering is prevented. And perforation very rarely happens in phthisis. Sir Thomas Watson has only known it in a single instance, and Craigie only saw it once in one hundred autopsies of consumption.

Some authors have spoken of chronic diarrhœa as the cause of ulceration of the bowels, but there is much want of exactness in such way of speaking, as the flux is but the sequent of foregoing and morbid causes. The constant and pernicious use of aperients and the continuous exhibition of certain irritant and corrosive drugs may at length institute this affection, but otherwise chronic iliac ulceration and its attendant diarrhœa most rarely, if it be not said never, occurs, except in association with tuberculosis. Among eighty-five subjects who died of various chronic affections and examined by Louis, only six presented ulceration of the small intestine. Three of the six had cavities in the lungs, and of the three others one had gastritis, and the other two dysentery. When chronic diarrhœa is not obviously referrible to the large bowel it is almost in every instance fundamentally of tubercular origin.

In the various forms of dysenteric disease the symptoms of this destructive process are broadly delineated, and the general indications significantly point out that morbid impress which pervades the entire system. There is symptomatic fever, which is more pronounced in the evening, the skin feels hot and dry, the pulse is quick; the tongue is covered with a whitish mucus, or, according to the stage and gravity of the disease, it may become brown and parched; the features look sharp and sunken; the eyes are pearly; and there is often irritability of temper or depression of spirits. The patient complains of twisting, torminal pains, which are remittent or exacerbated; in pressing the abdomen pain and tenderness are experienced over some part or along the entire course of the large bowel, sometimes it is felt most in the right iliac fossa and at the umbilicus, sometimes chiefly in the left flank, and with the continuance of the malady tympanitis and diffused abdominal tenderness eventuate. There is a repeated and constant desire to go to the night-chair, where for long periods the patient will sit straining in distressing manner in order to pass, if possible, some fancied cause of irritation, and occasionally sickness and vomiting ensue. The stools are varied; often they consist of a muciform, jelly-like substance, mixed with different amounts of fæculent matter, or they may exhibit no fæces at all. Sometimes they are of thin fæculence, watery, bloody, puriform, or as if white of egg had been added to them; and when there is hepatic complication they are often dark, greenish, and bilious, and in cases where the gall-ducts are obstructed they are of a dirtyish white, chalky, or cream-looking. In other instances round scyballous balls are voided, and in some cases the dejection resembles water in which flesh has been washed, and in it are seen floating shreddy matters, pieces of lymph, and partially decomposed strips of mucous membrane.

The microscope detects nucleated globules, and blood discs broken up or entire; and the smell is intolerably fetid, like the smell of putrid animal substance. When the ulceration is in the cæcum and ascending colon, blood, pus, and mucus are difficult of recognition, and the stools

are loose and liquid ; and when it is restricted to the sigmoid flexure and rectum, the tenesmus is often tormenting, and blood and mucopuriform secretions are blended with or streaked upon the fæces, which may be passed in greater or less degree of consistence. I may also observe that the contents of the bowel may have something of natural appearance, and be even partially moulded, even when considerable ulceration exists. When the descending portion of the gut is mainly affected often pain and weight are felt at the sacrum, and dysuria comes on as the consequence of reflected irritation to the bladder through the lower spinal nerves. In the grave forms cramps supervene, and the great nerve centres are affected.

The symptoms by which ulceration of the *Duodenum* may be inferred are a sense of pain, fulness and constriction at the epigastrium, especially at the right side, which comes on two or three hours after a meal. The pain is reflected backwards and upwards towards the right shoulder. On pressure the tenderness is limited to a small space, which is at the right costal cartilages. Nausea and vomiting occur, sometimes there are pyrosis and morning sickness, and the tongue is furred and preternaturally red at the tip and edges, the papillæ being large and erect. Some patients have complained of a sensation of gnawing at the stomach. The bowels are usually confined and irregular, and the appetite is capricious, the pulse is quick, the skin dry, and with the advance of the malady there is a wearing-down of nervous power, which renders the sufferer depressed or irritable. If the ulceration happen to be at the entrance of the bile-duct, the orifice is more or less obstructed, and then jaundice, clay-coloured stools, and dark urine are observed. When associated with severe burns epigastric pain, vomiting, and loaded tongue are the chief indications. When perforation takes place, there is, according to Sir Andrew Clark, sudden pain after food between the liver and crest of the ileum, its fixity and increase are characteristic of the accident, and swelling and tenderness of the belly, with costal breathing, quick small pulse, pinched features, and clammy sweats, usher in the fatal termination.

I have before remarked that the *Jejunum* is far less liable to disease than any other part of the digestive tube ; indeed, it seems to possess an immunity from acute lesion. In some very exceptional instances sloughs, typhoid ulcers, or the clear, vertically cut, pouched ulcer, like that which is not uncommon in the stomach, have been discovered in this section of the bowels. Such, however, are very rarely met with, even by those of the greatest experience in morbid anatomy.

In the *Remittent Fever* of Children there is pain at the right iliac fossa, often extending to the umbilicus, but it is frequently inconsiderable, even when these parts are pressed ; some gurgling is then mostly heard, and the stools are of yellow-ochrey colour, and on standing separate into a flaky sediment and supernatant fluid. The abdomen becomes flatulent, but not so tense and tympanitic as

in adults, and the cerebral symptoms are often prominently expressed, and in severe cases stupor is common. Rillet, Chomel, Murchison, and West regard infantile remittent as being identical with the type of fever commonly known as enteric, and what has already been said relative to the symptoms of intestinal ulceration in that affection in the adult, is in a great measure applicable in so-called infantile remittent.

When ulceration of the bowels comes on from without, that is, when it extends through from the serous to the mucous coat, it is generally by the pressure of some tumour, enlargement of the solid viscera, or as the consequence of carcinomatous formations either in connection with the abdominal organs, or deposited within the peritoneal sac.

PATHOLOGY.—This morbid condition, as before remarked, is a secondary and not a primary affection, and when it occurs it is the result of some organic lesion or constitutional malady, except in those instances in which it is traceable to chemical or mechanical irritants. It is very commonly the sequent of either the acute or chronic form of inflammation, but it may also eventuate from venous stasis of the portal system, in the low state of enervation, and in contamination of the blood. The glands and follicles, as previously observed, being endowed with a greater amount of vitality than other parts of the mucous corion, and being subject to greater irritation as the outlets to poisonous and effete matters eliminated from the circulatory fluids, are the parts most liable to assume this degenerative change. It has long been noticed that certain portions of the sub-diaphragmatic digestive tract are more predisposed than other portions to ulceration. Andral gave the relative frequency of intestinal ulceration as follows,—the lower part of the ileum, the cæcum, the transverse colon, the jejunum, the ascending colon, the descending colon, the rectum, and duodenum; and this order of placing the ulcerative tendency of the bowels has without any important difference been endorsed by more recent pathologists. The destructive process now considered is by far most frequently met with in the lower third of the ileum, either in connection with enteric fever, or tuberculosis; and, as I have before observed, in no other acute disease is it ever discovered, except in the first of these now named; and when witnessed as the accompaniment of a long-standing ailment, I believe that ailment invariably to be of a tubercular nature. In enteric fever ulceration of the ileum is the distinguishing pathological characteristic; and its almost uniform appearance there led Bretonneau to imagine that the essence of this fever consisted in this morbid condition, and hence his term *dothinenteria*. The solitary and agminate glands are found ulcerated in greater number and increasing sizes in the lower third of the small bowel, and near the cæcum the patches often coalesce into a continuous mass of ulceration. The solitary glands of the colon are frequently at the same time affected. The glands of the

jejunum do not so commonly exhibit this diseased change. Of a number of inspections made in this fever by Louis, in only three instances was the middle third of the ileum alone ulcerated. The Peyerian patches are elliptical, and always parallel to the longitudinal axis of the intestine. Now it is an important pathological fact to bear in mind that in chronic, phthisical ulceration of the ileum, the ulcerated areas are transverse or circular: they form a ring as it were round the inner surface of the bowel, and the circle is only incomplete where the intestine joins the mesentery. When perforation occurs it is at or near the caecal valve. In one hundred and twenty cases of phthisis, Louis found ninety-six to have ulceration of the ileum, and in one-sixth it pervaded the whole of this part of the tube. Craigie observed it in five-sixths of his phthisis cases; and in one-sixth it occupied the whole, and in two-ninths only the lower part of the small bowel. In this complaint it begins in the aggregate glands, seldom in the isolated follicles. This pathologist also asserts that ulceration of the colon was seen in nine-twelfths of the examples of consumption which he examined. Perforation is rare in phthisis,* because the serous covering is more gradually inflamed, and the plastic exudations become organized and seal up the orifice, and adhesion is effected. The mesenteric glands become inflamed and large. The malady may commence on the sub-mucous tissues, by tubercular deposit, the depositions at length becoming superficial and broken up. In dysenteric diseases, varying extents of the large bowel become red and tumid, these changes originating in the glands, and spreading to the surrounding mucous membrane, when destruction of the corion ultimately takes place, and ulcerated surfaces ensue. And this morbid process by several writers has been termed sloughing of the mucous tunic. Hepatic lesion is often the accompaniment. The duodenum, as before remarked, is very rarely ulcerated except in large burns and malignant disease.

MORBID ANATOMY.—Of the proneness of mucous membranes, and of that of the intestines in especial, to pass into ulceration, I have already spoken, and have also observed that on account of the greater vitality of the glands and follicles and the offices they subserve it very generally commences in these organs. When acute inflammation of the tissues gives rise to it there is more or less of redness, which may be uniform over large or small spaces, or it may be arborescent, asteroid, punctular, or linear. An opaque, film-like, adherent covering, chiefly composed of corpuscular elements, may invest varying extents of the inner surface, which has been regarded as homologous with certain cutaneous affections, such as pityriasis and eczematous eruption, and which has been termed croupous exudation; and when such covering becomes removed a reddish raw condition appears, which takes on secretional action, and this may become chronic. The solitary glands are often at the beginning surrounded by a halo, or look like small and petechial effusions

of blood; they may appear pustulous, and suppurate, when they at length burst, and over-lapping edges remain, the floor of the ulcer being the sub-mucous coat. When the tunic is chronically inflamed the morbid places are dark, rusty, livid discolorations in mere points or in extensive patches. The mucous tissue at the parts of lesion becomes soft, intumescent, opaque, and friable, the epithelium loses its transparency, and the sub-mucous tissue becomes infiltrated with serous fluid.

In enteric fever the agminate glands at the lower third of the ileum are found in greater or less degree of redness, and when the fever has continued for three or four weeks the patches become of reddish grey or yellowish, and as if stained with bile, and they often look honey-combed or reticulated. The ulcerations nearest the valve are the largest. One of the earliest changes in the membrane is that of elevation or hypertrophy, and the ulcer thus formed varies from the size of a hemp-seed to that of half-a-crown, is round or elliptical, but rarely or never zonular. The base is often the muscular coat and the margins are elevated, and exhibit a well-defined fringe. This ulcer never diminishes the calibre of the bowel. In intussusception, the blockage of a gall-stone, the tying down by a band of lymph, or phthisical ulceration may all be followed by contraction of the intestine. When a new membrane is formed it is thinner and more adherent than the healthy structure. When perforation occurs it is mostly within a dozen inches of the cæcum. In phthisis the ulcerations are as the rule transverse, chiefly at the lower third of the ileum, and occupying the patches of Peyer. Sometimes they extend round the circumference of the gut, and are of gray, red, blackish, or reddish-brown colour. The sub-mucous tissue is thick and uneven, crossed by small bands of mucous membrane, or the mucous tissue may be entirely destroyed. Softened tubercles are frequently seen, and the mesenteric glands may be creamy or cheese-like. The serous coat often becomes thick, and its free surface is covered with purulent secretion, or is adherent to an adjacent coil of the intestines, when there may be ulcerative intercommunication and interchange of the contents of the canal. The solitary glands of the large bowel in both enteric fever and phthisis are often ulcerated, involving varying extents of the neighbouring mucous corion.

In dysenteric diseases the colon at different parts of its course presents irregular and often large spaces of dark-red colour, which are sensibly elevated, fungus-looking, and vascular. They often resemble excoriations, or seem as if the mucous tunic had been detached, and between the places thus diseased the surface may be quite healthy. The parts of lesion are smeared with a mucoid, sanguinolent, or purulent secretion. Sometimes this pathological condition is in button-like eminences evidently originating in the glands. The whole tract of this portion of the tube may be thus in greater or less degree affected. It occasionally happens when scybala have been long retained, that each indurated piece of faecal matter becomes

embedded in an ulcerated nidus. The ulceration of the duodenum is mostly associated with carcinoma or extensive burns.

DIAGNOSIS.—As pertains to *diagnosis* it may be concisely asserted that diarrhœa and the character of the stools are the most distinguishing facts. The kind of primary disease should always be duly regarded. When the small bowel is the seat of the affection there is tenderness on pressure at the right iliac region, and in fever some gurgling is generally expressed. The dejections are pultaceous, or liquid, the morbid secretions are difficult of detection, and pieces of undigested food are often mixed with the evacuation. When the colon is the seat of lesion the tenderness corresponds with its course; the stools may be more or less formed, they are sometimes scyballous, and are passed with varying amounts of gelatinous, purulent blood, or membranous products—or they may seem quite devoid of fæcal matter, and subsequently the dejections are acrid, liquid, and frequently voided. When the rectum is ulcerated there is often great tenesmus. Abdominal pain is not a prominent symptom, and it is dull and obtuse, not sharp and pungent. The pulse may be slow and the symptomatic fever inconsiderable. In peritonitis the pain is acute, augmented by pressure, begins at a particular part, and the tenderness is gradually diffused over the entire abdominal surface; the bowels are confined, and the pulse is small, hard, and quick. In enteritis flux and the peritonitic symptoms are associated. In mere diarrhœa the stools are fæculent. What has before been said in description of the symptoms may be referred to in diagnosing the complaint.

TREATMENT.—The *remedies* should be prescribed with a reference to the primary disease. When the affection is the accompaniment of fever, and there is acute abdominal pains, fomentations, poultices, or even a few leeches are to be employed. Turpentine stoups are also beneficial. The compound chalk-mixture, with aromatic confection, catechu, kino, rhatamy, logwood, and the various preparations of opium may be ordered, and opium enemata are of signal service. In phthisis chalk, bismuth, kino, catechu, the infusions of oak bark, logwood, rhatany, and the tincture of galls, and maticho, combined with opium, are amongst the most effective agents. In the more advanced form of this complaint I have found the oxide of silver, sulphate of copper, and the liquor ferri pernitratis very valuable medicines; and opiate enemata or suppositories are at the same time to be administered. In dysenteric affections ipecacuan is of the greatest use. The food should be bland, light, and digestible, such as the farinaceous articles of diet, milk, and strong soups, and pounded meat may be allowed. The soups should be strained, and all solids for some time interdicted. This precaution in the ulceration of the bowels in enteric fever is of the greatest consequence, as fatal perforation may result from an indigested morsel.

VIII.

CARCINOMA OF THE BOWELS.

CANCER of the bowels is a rare disease, and far less frequently met with than cancer of the stomach. It is nearly always primary, and in most instances isolated. It sometimes there eventuates, however, as an extension from neighbouring parts, as when the serous membrane has thus become affected, or it may be the mesenteric and other abdominal lymphatic glands; and also after the complaint has become seated in the lesser omentum, the stomach, or in one or other of the pelvic genito-urinary organs. It is much more prone to occur in the large than in the small intestines. Out of three hundred and seventy-eight fatal cases in no less than in two hundred and twenty-one was it in the rectum. The last named part and the sigmoid flexure are the usual places of the complaint. In the cæcum and the colon it is exceptionally discovered. The small intestines, the duodenum, and the jejunum are the sections mostly elected by the lesion. In the bowels it is detected in the scirrhus, medullary, and alveolar or colloid forms. It is often first deposited in the scirrroid character in the submucous connective tissue, and after the mucous lining has undergone degeneration the medullary condition obtains. The deposit is often rounded and lobulated, with a disposition to be mostly accumulated in the transverse direction, and I have in repetition noticed it, as it were, channelled through, the calibre of the gut being constricted, but sufficiently patulous for the passage of fæces. And I believe that patients sometimes live a long time with this partial occlusion, and when indigestible articles of food are avoided. When the malignant growth has become considerable the diseased part of the canal sinks low down, and for a time it remains free and movable to the touch; but with the progress of the affection it becomes adherent and soldered to the adjacent viscera, and thus mechanically still more interferes with the normal action of the intestines. Immediately above the seat of the deposit the coats of the bowel become greatly distended, the muscular tunic is rendered hypertrophous, and sacculated accumulations therein take place which often give rise to fatal obstruction, the symptoms assuming all the conditions of ileus. The cases now about to be given will illustrate certain statements above made.

CASE I.—A man, aged sixty-four, became an out-patient of the

Hospital. It was ascertained that he had had attacks of pain in the stomach and sickness on previous occasions. The illness for which he sought advice began several months previously. He complained of having greatly suffered from sickness. He had had constant sharp pains in the right hypochondriac region, which were generally increased on taking food. On palpation there was a considerable amount of localized tenderness, but no tumour could be felt. He was much emaciated, his appetite became more and more impaired, and he took nothing but fluids. The tongue was large, flabby, and indented at the edges, but clean with the exception of a white streak down the middle. The bowels never acted except when he took some aperient medicine. He gradually lost flesh and strength, and at the end of three months he died.

An examination after death was obtained. On opening the abdominal cavity there was much emaciation, and all fat had disappeared from the omentum. The duodenum, just where it embraces the head of the pancreas, was the seat of an obviously cancerous growth. The bowel was thickened to the extent of an inch in that part of the wall where there was the greatest amount of deposit, and an open ulcer of the scirrhus-colloid description was discovered. The glands in the neighbourhood were affected, but there was no malignant deposition in the stomach, liver, spleen, pancreas, or any other organ. The left lung had become impervious to air and solidified towards the base. On specimens of the growth being put under the microscope, cancer cells were seen. These were large, nucleated, free, and canalated cells, which left no doubt as to their specific and malignant character.

CASE II.—I was requested some time ago by Mr. Bisshope of this town to see with him a lady seventy years of age, who had been taken suddenly ill with acute abdominal pains in the right iliac fossa. This was accompanied by sickness, and soon there was diffuse tenderness over the entire abdomen. She was a stout, muscular woman, who had been in fairly good health until the time of this attack. She had been to church four days previous to my seeing her. When I first saw her she was in bed lying on her back, with the knees somewhat drawn up. The pulse was quick, the temperature augmented, the skin hot to the touch, and there was very great tenderness on even moderate pressure of the abdomen. The tympanitis was in marked degree. There had been no passage of the bowels for more than forty-eight hours. I expressed the opinion that there was malignant obstruction of some portion of the digestive tube lying on the right side. On the following day the sickness became more distressing. She had large and repeated opiates, terebinthinate epithems, fomentations, poultices, and all the ordinary remedies employed in such cases, but with no abiding advantage. Stercoraceous vomiting supervened, the surface and extremities became cool, no passage had been effected, notwithstanding the aperients and copious enemata which had been used, the pulse gradually became

smaller, and she sank under all the symptoms and conditions of general peritonitis.

On an examination being made of the body the very characteristic appearances of acute inflammation of the peritoneum were revealed. At the juncture of the ascending and transverse colon, a mass the size of a small orange was discovered; it was hard and resistive to the fingers, and immediately in its vicinity the peritoneum was much inflamed, and lymphic deposits were there thrown out. On a section being made of the bowel it was constricted at this part, and the hard substance was a scirrhus ring which had so encroached upon the calibre as to block up the passage. In the upper portion of the tube the faecal accumulation had evidently produced inflammation and the fatal result.

CASE III.—A married woman, was first seen as an out-patient by the House-Surgeon, Mr. Cleland Lammeman. She complained of intense pain radiating from the right hypochondrium towards the umbilicus. She said it had come on suddenly; it was increased by pressure and movement, and there were repeated attacks of vomiting. She was a well-nourished woman, but the countenance had a pinched look. She was not jaundiced, but the conjunctivæ were muddy, and the expression was cachectic. She was lying on her back, and could not lie on her right side, as that position greatly increased the pain. The physical signs of the chest were normal. On palpation of the abdomen and on percussing the hepatic region, the liver evidently from two to three inches depended lower than its proper line. The tongue was furred, the appetite impaired, the bowels were confined, and the vomiting was distressing. The urine was high-coloured and scanty. She was restless, and slept little. She was treated with hot fomentations, poultices, and turpentine stoups; had calomel and opium, and latterly full doses of opium alone. When she was brought into the hospital, she had stercoraceous vomiting. In despite of all remedies she gradually sank, and died at the end of a week from the beginning of the attendance, all the phenomena of diffused peritonitis having been exhibited.

On inspection four ounces of serous fluid were discovered. The intestines were enormously distended, and the appearances and products of inflammation observed. The liver was large, and thrust downwards. At the junction of the ascending and transverse colon was a mass of scirrhus cancer of from two to three inches in diameter. The cæcum was completely filled with fluid faecal matter, and in it were found four plum-stones. At the part of the bowel where the malignant growth was found, the product was noticed to also encircle the tube in ring-shaped form, and thus the calibre was so narrowed as to be almost occluded. At this narrowing a plum-stone was seen impacted, which was sufficient to completely block up the passage, and at that point the mucous membrane was of ragged surface, and showed all the conditions of old ulceration. It

is presumptive that if this fortuitous circumstance of blockage had not occurred the patient might have lived longer.

CASE IV.—I received an urgent message to meet in consultation Mr. Wallis, of Hartfield, Sussex. It was to see a farmer in that neighbourhood, who was reported to be dangerously ill. The patient was a thin, tall man, married, and of fifty-eight years of age. Up to a year previously he had enjoyed tolerably good health, and had been fully capable of attending to his business. Three months prior to the consultation he had requested Mr. Wallis to prescribe for him. It was then reported that his bowels had been irregular; sometimes they were confined, and at other times there had been diarrhoea. He had lost flesh and strength, and his appetite had for some time been impaired. The motions had been in small, indurated pieces, and not continuous and molded as in the normal manner. He had complained of pain in the left hypogastric region, and sometimes these pains were sharp and stabbing. He had not passed blood or mucus, and when he was seated in certain positions he felt comfortable. There was the history that three relatives had died of cancer. When I saw him the face looked worn, and he had a pale, yellowish, cachectic appearance. He then lay on his back in bed, the abdomen was tympanitic, and there was evidently considerable emaciation. He did not complain of much pain, but was weak and depressed. The pulse was eighty, small, and compressible; the tongue was coated, and the skin felt dry and cool. The bowels were confined. He had copiously passed water immediately before our consultation. There was no history of vesical disease; he could urinate at will, and never had any pain or inconvenience in emptying the bladder. Strange enough, on carefully examining the urine he had just before evacuated, it contained fecal matter. I introduced my finger up the rectum, and its tip felt a large hard mass, which on being slightly pressed upon exquisite pain was produced. There was no doubt of this tumour being malignant. The friends were told that in no great length of time he would die. Repeated attempts had been made to inject enemata, but they always returned. Absolute obstruction supervened. The symptoms of flagrant peritonitis came on in the course of a few days after I consulted with Mr. Wallis in the case, and he rapidly sank.

An examination after death was granted, and I again met Mr. Wallis at the inspection. Very diffuse peritonitis was discovered, and there was a large, hard scirrhus tumour detected at the sigmoid flexure, which completely closed the passages, and there was also a small communication between the bowel at the diseased part and the bladder, and hence an explanation of the feces passing into the urine.

REMARKS.—In briefly commenting on the first example above given, it may be noticed that the more prominent symptoms of which the patient complained, and his general appearance, rendered it exceedingly presumptive that there might be malignancy. It is a fact

worthy of remembrance that there is always much difficulty in diagnosing this affection in the duodenum : and there are various reasons why such should be the case. Its form, the direction it takes, and its relation to several organs and parts, are circumstances giving rise to embarrassment. Again it is often in secondary manner affected, as when the complaint has preceded in the stomach, the pancreas, the liver, or in the lymphatic glands. The morbid conditions of these parts would tend to obscure the lesion of that section of the digestive tube now considered. When the growth is at the pylorus it will occasionally extend into the duodenum. The symptoms of cancer of the stomach greatly resemble the symptoms of cancer of the duodenum. In both there may be pain and fulness over the epigastrie and the right hypochondric regions, with discomfort after food ; and in both there may be sickness and vomiting with the ejection of biliary or coffee grounds matters, and more or less of melanous stools. When in the duodenum it is not uncommon for complaint to be made of pains shooting through into the back. In the earlier stages of the disease more especially, manipulation may detect no tumour. In this instance, as reported, such could not be made out even at the close. Generally, however, in the course of time a lump can be felt. It then feels under the fingers hard and movable, and its displacement is attended with a feeling of tenderness, or it may be of more absolute pain. There is not uncommonly a gnawing, sinking feeling in the umbilical and epigastric regions, and visible fulness towards the right hypochondrium. If the palmar surface be applied to such elevation and gentle pressure be made it occasionally occurs that a curious croaking noise is heard by the contained gas being forced through the pyloric orifice. The unaffected portion of the duodenum is liable to become greatly dilated ; and the stomach may also be much distended. In this man the mass on the mucous surface of the product had assumed that open, ragged, colloid form in which it is generally discovered when the disease has for some time obtained. When carefully examined the open surface has a cupped appearance, with more or less of sloughing and fungus granulations. This example well shows the affection in its primary nature, and how adjacent organs and tissues may be free from the complaint. The utter absorption of fatty matter, and more especially of that of the omentum, was a fact characteristic of this disease.

The second case gives evidence, as I have in repetition observed, that emaciation is not always the accompaniment of malignancy. It is very probable that the scirrhus tumour had long been present, and that the fecal accumulation, by producing obstruction, anti-peristaltic action, and peritonitis, in the usual manner caused a fatal termination. And the same remarks equally apply to the third instance. In both life had for some time gone on until absolute blockage instituted other acute and hopeless symptoms. So long as the contents of the bowel pass through the narrowed passage the patient is not greatly inconvenienced, and he long maintains often a

condition without much visible alteration. Sometimes, however, during the earlier or scirrhus state constipation and diarrhœa may from time to time produce much discomfort. I have known sudden attacks of diarrhœa come on at intervals, and accompanied with much persistent and painful distension. I remember one very illustrative case of this, which is now described, in a fine-looking man between fifty and sixty years of age. The tympanitis before his death was most distressing. The abdomen was enormously enlarged, and he said his suffering was extreme. After death a tumour on the sigmoid flexure was discovered which held in certain positions was patulous, but the passage through it had acquired a valve formation, and thus the intestinal gases accumulated. In the woman, whose case is before given, the circumstance of the presence of the plum-stones at once curtailed her existence. In the fourth example there was marked irregularity in the action of the bowels; they were sometimes confined, at other times he laboured under looseness. In him the sharp, darting, stabbing pains, so characteristic of cancer, had formed a prominent symptom. The ulceration into the urinary bladder was a complication which occasionally eventuates. Sometimes these fistulous communications extend from one part of the bowel to another, or open into the cavity of the abdomen, when death rapidly ensues, or in the female they may communicate with the vagina.

It has already been remarked that cancer of the intestine extends transversely, and its deposition is sometimes in a sort of ring-formation. The muscular structure becomes augmented, and also perforated. When the peritoneum has become implicated localized peritonitis ensues, the ordinary lymphic and other products are thrown out, and thus agglutination of adjacent parts eventuates and the tumour becomes fixed; with the progress of the affection there may be rupture and extension of the contents of the bowel into the abdominal cavity, as before noticed. But such is not of frequent occurrence, as the effused matters consequent upon chronic and partial inflammation give rise to considerable adhesion and the welding together of the surrounding viscera. It has been said that the bowel immediately above the seat of lesion is liable to become greatly distended with fecal accumulation; and its coats at this part often acquire an immense thickness—thus becoming conservative, as it were, against the more disastrous event of rupture. The intestine just below the enlargement is for some distance collapsed and shrunken. When the scirrhus description predominates contraction of the calibre of the canal is more likely to obtain than in the more encephaloid and alveolar varieties. In the encephaloid there is more vascularity, and hæmorrhage is liable to come on, and sometimes to an alarming or even fatal extent, precisely as blood is thus lost when that form of the disease invades the stomach. Scirrhus and the encephaloid or alveolar are not unfrequently found in association. The hard tumour on its inner or mucous surface exhibits an ulcerated condition; it is seen covered with a glaring fluid; there

may be discovered shreds of detached tissue, and sometimes there are dark, discrete, melanotic spots on the corresponding part of the serous covering. On microscopic examination the condensed parietes are proved to consist of fibrous tissue with elongated, nucleated cells. The softer parts show many of the cells to resemble large columnar epithelium with a large nucleus. In certain instances these cancer cells vary much in size and form, and there are some oval or circular, others are elongated or fusiform; and in nearly all a distinct nucleus can be detected. In these examples of disease there are other and sequential phenomena, which are of much pathological interest. Cancerous germs, it is now well known, pass into the circulation, and may be transferred to parts far distant from the primary location of the disease. The carcinomatous product may be deposited in the veins, and around it the coagulation of the fibrin of the blood may be to such amount as to give rise to absolute blockage; and hence in that lowered, watery, and impoverished state of the blood so common in malignancy, dropsy is the result. In instances of this kind the superficial veins over some circumscribed area are apt to be large and tortuous. When the femoral vein is in this manner obstructed there may be an edematous condition of the whole of the lower limb of the side affected. When, as I have known, in abdominal cancer there is a filling up of the ascending vena cava, the superficial veins of the right side of the body may become very large, and by their fulness and tortuosity a very marked and peculiar appearance is presented.

CASE V.—I may here give the particulars of a case in which I was called in consultation. A gentleman of more than fifty years of age began to lose his health. There came on a gradual loss of flesh. He lost his former energy, and complained of feeling unwell. For some time he had experienced the feeling of a dragging weight at the left epigastrium, accompanied with numbness down the left leg and extending to the toes. The stools were attenuated. There was tenderness at the neck of the bladder, as evinced by aching pains at the perineum, and repeated micturition. A round, hard lump was felt; its movement gave pain; whether wholly or partly fecal, or not, it was manifestly in proximate connection with diseased structure. There was excessive tenderness over the entire abdomen, but the pulse was of good volume, and not more than one hundred. The cachexia, the loss of flesh, and the stooping towards one side, in accommodation to the dragging weight at the left hypogastrium, in particular, also the various other symptoms, were indicative of malignant disease, and to this conclusion I gave my opinion. I saw him again from time to time, when the symptoms became more urgent and pronounced. He died. A few days before his death he passed scybala of the size of small walnuts; hence there was not great occlusion. There may be absolute obstruction in the bowels, from other causes than cancer. Such may be from intussusception, from a matting together or strangulation by effused lymph, an adherent *appendix*

vermiformis, a large gall-stone, and other conditions—and even from such causes a false anus may be formed. Rokitsansky long ago said, when there is malignant disease in the intestines it is almost always in some part of the colon.

The immediate cause of death, as seen by inspection, was rupture, which occurred just above the diseased mass, which was of circular conformation. The perforation was not a slit, but punched and round, clearly defined, without any lipping out of the mucous membrane, as we discover in a wound or tear. This kind of round hole I have seen in idiopathic peritonitis, and in typhoid fever I have noticed it repeatedly. It proclaims ulceration, softening, absorption, and the destruction of the tissues, and in this kind of perforation in the abolition of the tissues the external and internal plates coincide. The disease extended to the place of perforation, as one of these abnormalities of the tissues, associated with these heterologous products. In a cachectic subject, in one whose general strength had well-nigh succumbed to the acuter attack of the disease, and which had not terminated, the great shock attending the sudden effusion of a large quantity of semifluid faecal matter into the cavity of the perineum was certain to be quickly followed by a fatal issue, as in this instance it occurred.

SYMPTOMS AND DIAGNOSIS.—With regard to the symptoms and diagnosis, there being so many sources of fallacy it is often most difficult, more especially in the earlier stage of the disease, to arrive at a correct conclusion. The patient will generally describe a dull, aching, or lancinating pain as having been experienced at some part of the abdomen, as being the first intimation of his trouble. This pain comes on with no regularity, being often in paroxysms, and is frequently accompanied with constipation; and such confinement of the bowels may for some time have been habitual, and given rise to much inconvenience. Often the belly is from time to time puffed up, and with the advancement of the affection nausea and vomiting come on. At the first, when some aperient is taken, the bowels are acted upon, and for a while there is tolerable comfort. Upon particular inquiries being made it is often ascertained that the alvine dejections are of flattened appearance. When the disease is in the rectum they are thin and ribbon-like. It need hardly be remarked that the age and general aspect of the patient are to be carefully taken into account, malignancy being far more common in middle and advanced life. The gradual loss of flesh and strength are ever unwelcome facts. There is in most instances more or less of the cancerous cachexia. But various sources of hæmorrhage may be followed by a bloodless appearance, and it is well by inquiry to set at rest any supposition of this kind. The anæmic condition of women, resulting as it does from amenorrhœa the consequence of impaired nutrition and the lack of hæmatine; or in menorrhagia when there is an absolute drain of the vital fluid. Again marsh poison gives rise to that sickly pallor which carries with it so much significance. On inspection,

and more especially when the tumour is at the cæcum or sigmoid flexure, often a smooth, rounded elevation, by comparison with the unaffected side, may be observed. But such prominence may be from causes other than the affection considered. On the right side the liver may depend, or a growth from this viscus exist; the right kidney may be dislocated or enlarged, or the cæcum may be very greatly distended with feces. On the left side splenic tumour, the kidney, and impaction of the colon are to be brought to mind. When the enlargement is malignant it is told that purgatives can be borne without any great additional discomfort. In simple inflammation of the part purgatives are followed by an augmentation of the more urgent symptoms. In cancer moderate pressure with the flat hand produces pain, and at the first the lump is movable.

When the elevation is merely caused by flatus percussion elicits sonority, but over a condensed or solid body the dull note delineates the outer lines of the growth. If the enlargement be fecal, and more especially in the case of a person emaciated, and whose abdominal walls are thinned, an irregular surface, and often *sulci*, can be felt; again, the administration of a large enema, by altering its configuration and position, as it may be by effecting its removal, solves the difficulty. With the progress of the case the diagnosis is rendered much more certain, and generally all doubts are cleared up. Some unusual circumstance, however, occasionally brings an unexpected proof of error. Mr. Rix, of this town, requested me to see with him an old lady eighty years of age. He had been for some time in attendance. The patient looked thin and worn, and had for long complained of pain and uneasiness in the right side. On inspection between the cartilages of the ribs on the right side and the crest of the ileum, there was an elevation equal to the section of a large orange. On manipulation it felt hard and resistive. It could readily be moved, but its movement gave pain, and there was much surrounding tenderness. The action of the bowels had been much interrupted, and the abdomen from time to time had been distended. Various remedies with a view to the displacement of the lump had been employed, but nothing lessened its volume or removed the pain. It was the opinion of Mr. Rix, in which I expressed my concurrence, that it was most probably malignant. The treatment was directed according to such way of thinking. Some time passed over, and there was no amendment in the lady's condition. To the utter surprise of Mr. Rix, as well as myself when he told me, a large biliary calculus of the size of a pigeon's egg was voided. After its passage the tumour became reduced; the localized pain and tenderness disappeared, and the patient made a full recovery. In this instance it is extremely probable that impaction had taken place at the ileo-cæcal valve, and that circumscribed inflammation had been produced. The cause being removed, those symptoms which had so seriously simulated cancer at once began to subside. In those instances which are malignant with the progress of the case the

sallow hue of the features becomes more proclaimed; the general wasting and loss of strength go on; the constipation or diarrhœa, the sickness and vomiting, are more and more recurrent; the mass is rendered fixed, and the pain and tenderness increase; and there may be more or less of intestinal hæmorrhage. Towards the end often, as I have painfully witnessed, the tympanitis becomes most distressing; the distension of the colon and the coils of the ileum can be distinctly traced, and the anti-peristaltic action acquires spasmodic movement; and this anti-peristaltic action may, as I have seen, with much suffering obtain when the passage is patulous, and when the part of contraction would admit the finger. At length absolute obstruction in many cases eventuates, and all the phenomena of fatal ileus are presented; or the peritoneal covering, after having been inflamed and red and thickened, or it may be absorbed and thinned, gives way, when diffuse peritonitis rapidly closes the scene.

TREATMENT.—When we are certain as to the true nature of the malady, it is needless to observe that a palliative treatment can alone be attempted. It is always well to maintain the passage of the bowels so long as such can be done. Concentrated articles of diet should be selected, such as are nourishing and which have the least amount of residua. When there is much pain opiates are to be had recourse to, with a view to an euthanasia. In certain and selected cases colotomy is to be recommended. Though usually so loathsome in its after effects, in the dire suffering which sometimes occurs it may confer some repose; and in those who under such afflictive circumstance still desire life, it may for a time put off “the inevitable hour.”

IX.

FATAL OBSTRUCTION OF THE BOWELS CAUSED BY A BAND OF LYMPH.

THE case now recorded is one of considerable interest, and well exemplifies how it sometimes occurs that the cause of obstruction and a fatal attack of peritonitis cannot be diagnosticated. A widow woman, sixty-eight years of age, was admitted into the Tunbridge Wells Hospital. On admission it was evident that she was dangerously ill, the features being sunken, the surface cool, and there being great prostration. She complained of intense pain in the abdomen, and had to be carried into bed. It was reported that her bowels had not been moved for fourteen days, and that for twelve months previously she had had the greatest difficulty in keeping them open; that sometimes she had had attacks of diarrhoea, and at other times the dejections were of constipated character, frequently the pieces of fecal matter voided being not larger than hazel nuts. On examining the abdomen it was round and smooth, and percussion elicited clear tympanitic notes. She could not bear even moderate pressure, and she lay on her back with her legs partially drawn up. The respiration was accelerated, but the physical signs of the thoracic organs were normal. The tongue was brown, dry, and coated. The pulse was small, compressible, and one hundred and twenty. An opiate, hot fomentations, and a large domestic injection, to which turpentine and the tincture of assafoetida were added, were prescribed. She had beef-tea, wine, and brandy at short intervals. The injection brought away hardly any fecal matter. The distress caused by tympanitic distension continued with little alteration. Soon after having come into the institution she began to sink, and died on the following day.

The autopsy was made twenty-three hours after death. The thoracic organs were healthy; the liver was large, fatty, and of the nutmeg character; spleen small; pancreas, kidneys, and uterus and its appendages were of the ordinary appearance. Bowels exceedingly vascular and distended. The ileum in the lower half of its course was of a livid reddish colour. At the commencement of its lower third it was encircled and constricted by a band of lymph; and when freed from this organized ligature the bowel did not regain

its former calibre. A whitish ring marked the place of constriction. The gut was not absolutely occluded, but very nearly closed. The part immediately adjoining and below showed all the coats to be thickened. The distension was greater below than above the place where it had been tied down. The tube above the constriction was distended, and dark and vascular for the space of ten inches. There was no very marked appearance of peritonitis beyond the extent named. To such length of the bowel the peritoneum was dull, somewhat rough and thickened. In other parts the visceral and parietal serous covering exhibited its normal transparency and polish. About half-a-pint of cloudy serum, in which hardly any flocculi could be observed, was contained in the abdominal cavity. The faecal accumulation was inconsiderable, and chiefly of the pulraceous consistence.

In examples of this kind, when a careful reference has been made to the history of the patient, it has been ascertained that a foregoing attack of acute peritonitis has been discovered to have occurred. And many years may elapse between the date of the acute inflammation of the peritoneum and the fatal event produced by the binding down and absolute obstruction of the passage. The inflammatory products given off by this extensive serous membrane are often very considerable, and must needs require a long period after the decline of the disease before such become absorbed. And during absorption the materials may so alter in their configuration, contract, and be rendered more binding and of the ligature description, as to become far more perilous. Again with time such encircling bands acquire greater strength and tenacity by being more organized. And when the calibre has been greatly contracted, life may go on without any great inconvenience, if moderate attention shall have been paid to the action of the bowels and the kind of ingesta which have been taken. The accidental circumstance of blockage by a piece of undigested food, a portion of indurated faecal matter, or (as I have known) even a large fruit-stone, may quickly usher in the mortal issue. This kind of irritation at a given section of the alimentary canal may, in those with a predisposition to malignity, constitute the starting-point of scirrhus deposit, and from analogy we are aware that cancer of the bowel elects those portions of the tube where from mechanical reasons there is the most irritation, as at the pylorus, the bend of the sigmoid flexure, at the ileo-caecal valve, and at the rectum. In the case of this woman no account of an antecedent attack of peritonitic inflammation could be elicited. There was no carcinomatous deposit at the seat of lesion, nor in any other portion of the digestive canal. The tough and organized narrowing at the place of stricture proclaimed the seat of obstruction to have been for some time existent.

X.

ACUTE PERITONITIS AND DISPLACEMENT OF THE CÆCUM.

THE case about to be related is one of very unusual description, and presented remarkable characteristics, which could not possibly have been known without inspection after death. A stout, muscular man, thirty-seven years of age, who had been employed as the driver of railway waggons during the construction of a new branch line in this neighbourhood, was admitted into the Hospital. On admission he was in a state of great prostration, the abdomen was distended, and he complained of much pain in the bowels. He had been under the care of Mr. Wallis of Hartfield, and at the first there were all the indications of obstruction; purgatives had been given without effect, and for several days there was no motion. Considerable sickness and vomiting followed the purgatives. When I first saw him he lay on his back with his knees drawn up; the features were sharp and sunken, the surface was bedewed with a clammy sweat, the legs were cool, the breathing was markedly thoracic, the pulse was small and compressible, the tongue was furred and moist, and he complained of much thirst. The physical signs of the chest were, as far as could be ascertained without fatiguing him by movement, normal; the abdomen was very tympanitic; there was diffused tenderness on moderate pressure, and acute pain when the left hypogastrium was pressed. He said he had been at work up to a week before, and for some days previous to that date he had felt weary and weak. He attributed his illness to having drunk a large quantity of porter. During the two nights which he was in the institution, he had at intervals been delirious, and had attempted to get out of bed.

He was treated with opiates, injections, terebinthinate epithems, hot applications to the extremities, ammoniacal and ethereal stimulants, and wine and brandy. The pulse became smaller and more compressible; the facial collapse more pronounced; and he died three days after admission, the mental faculties remaining clear to the last.

SECTIO CADAVERIS, twenty-seven hours after death. *Thorax.* The lungs were healthy. There were no pleural adhesions. The heart was normal, but filled with dark coagula. On opening the abdomen

the ileum lay in large inflated coils, which were injected and not so smooth and polished as in health. The serous effusion was inconsiderable. The stomach was thrust high up under the diaphragmatic arch. The left lobe of the liver was pushed towards the right side. The cæcum was very large, and lay in the *left hypochondriac region*; and it was united to the great omentum, colon, and ileum, by masses of organised and more recent lymph. On being removed, it seemed as large as a stomach; and on being cut open, contained a large quantity of pultaceous biliary matter. Its mucous lining was dark and vascular, imparting a stained port wine hue to the villous coat; and this staining extended for six inches into the ileum, when it gradually shaded off. At the colonic side, this colouring abruptly terminated. The ileo-cæcal valve was greatly dilated. When examined between the fingers, the cæcal parietes were very tender, and readily lacerated. Superimposed on the mucous surface was a semiorganised deposit of lymph. The submucous areolar tissue was intensely injected. This part of the bowel had an indurated, coriaceous feel, and the entire morbid appearances were those of long standing disease. There were no ulcerated patches in the lower third of the ileum, the solitary and agminate glands being quite healthy. The remainder of the digestive tube and all the other organs were normal.

This case presented features of great interest. Symptoms of a contradictory character were exemplified, which rendered the diagnosis difficult. That he was labouring under acute peritonitis was, from my first visit, indisputable. But was it from perforation, and that the complication of enteric fever? or was it inflammation of the peritoneum referrible to some other cause? Some dozen days before his death he had laboured under *malaise*. He had had rigors, muscular pains, and headache; also loose ochre-coloured stools; and there were three or four spots, which I fancied became somewhat fainter under pressure. Again, he had been slightly delirious, and attempted to get out of bed—a symptom common in enteric fever. A review of all these facts threw much weight into the scale of the supposition of fever. But there were other circumstances which opposed this theory. He had been at work only seven days before; the spots were not such as to render their evidence conclusive; the temperature was not high; the diarrhœa had continued only for two days; constipation had followed; there was no gurgling in the right iliac fossa; his slight delirium might be referrible to symptomatic fever, and perforation of the intestines very rarely comes on in enteric fever at so early a date. Peacock mentions a case so soon as the eighth, and Louis one on the twelfth day; but, according to Tweedie, Jenner, Bristowe, and Murchison, this accident generally occurs after the second week—mostly much later. Again, in enteric fever, death does not, as the rule, occur so soon. In typhus, the critical day is on the fourteenth; in enteric fever, on the twenty-second. The *post-mortem* examination showed death by peritonitis,

but not as the complication of fever; Peyer's patches being healthy. The displacement of the cæcum was such as I had never seen; and no statement elicited from the patient threw any real light upon the disease. Copland says, when the cæcum is much enlarged or otherwise diseased it may also be *displaced*. Salzmann (*Plurium Pedis Musculorum Defectus*), and Annesley (*Diseases of India*) give instances in which its attachment to the internal iliac muscle had yielded so far that it had passed over the *left* side, and others in which it had descended into the middle of the pelvis.

XI.

PELVIC CELLULITIS.

A DOMESTIC servant, single, aged nineteen, was admitted into the hospital on May 16th. She was extremely thin and emaciated, her conjunctivæ were blanched; she looked anæmic; the countenance was expressive of suffering; and she stooped so much as to resemble spinal curvature. On being interrogated, she stated that prior to February she enjoyed excellent health, the catamenia then being regular, and the figure quite erect. On February 1st she took cold by standing for a long time on a damp brick floor; and this being at the time of a monthly period, the secretion was suddenly arrested. She at once began to experience severe pain at the umbilical and right iliac regions; it became fixed and continuous, and she could only lie on her back. Her medical attendant pronounced her case to be one of internal inflammation. Fomentations and poultices were applied; and, amongst other remedies, in her own words, "a blister of the size of a plate was put on the lower part of the belly." The inflammatory symptoms gradually subsided; but considerable stiffness and swelling remained at the right hypogastrium and the inguinal space.

On admission, the physical signs of the thorax were normal, with the exception of the systolic sound being shorter and less loud than natural. Inspection now showed the right hypogastric, iliac, and inguinal regions, and also the upper third of the thigh, to be tumid and unsymmetrical. These parts on palpation were hard and brawny; the pitting on pressure was inconsiderable; and the colour varied little from that of other parts of the surface. On being turned on the left side, the same condition extended to the nates. Steady pressure at the iliac fossa gave pain. Pulse ninety-six, small and compressible; tongue covered with a moist creamy fur; appetite impaired; bowels confined. On digital examination *per vaginam*, the uterus was felt to be of ordinary size and in its proper position; but there was some narrowing of the vaginal passage, and a tumid bulging condition of the wall towards the right side. There was no purulent discharge from this passage, nor yet from the bladder or rectum. Shivering occurred two or three times daily; and towards evening the face became flushed and feverish. There was great prostration, and she was confined to bed. Fomentations and

poultices were applied to the tumid parts, and the abdomen was supported by a broad flannel bandage. She took quinine and the tincture of the perchloride of iron, and morphia at bedtime. A diet of strong soup, meat, and farinaceous food was ordered, and ten ounces of wine were allowed *per diem*. She was under this treatment for a fortnight, with but little, if any, change in her condition.

On May 30th purulent matter spontaneously issued from the vagina to the amount of two or three ounces. During the subsequent month or five weeks, there was a small but constant secretion of pus; the pulse became of better volume, the rigors decreased; there was less flushing of the features, a mitigation of symptomatic fever, the appetite improved, and she looked less attenuated. The stooping was not so considerable, and inspection and manipulation of the tumid parts discovered manifest improvement.

July 15th. The purulent discharge was reported not to exceed a couple of tablespoonfuls in twenty-four hours. The configuration of the right side of the abdomen and upper third of the inferior extremity was much more natural; the swelling was greatly reduced, and did not feel nearly so thick and brawny. She could, with an effort, assume the erect position, and in all respects was much better.

Aug. 2nd. She was much improved. The secretion was not more than a tablespoonful in the day. The tumescence had nearly gone. She was fuller in the face and of better colour. I urged her to again try cod-liver oil, which she was unable to retain when previously ordered. Generous diet and wine were continued. Her progress from this date was marked and uninterrupted, and she was discharged September 3rd. When she left the hospital there was very slight purulent discharge; she had then regained flesh, there was but slight stooping, the pulse was natural, and she was quite convalescent.

In December there was some return of the acute symptoms, and the tumefaction of the parts before swollen was again apparent, with increase of the purulent secretion, which had never yet finally ceased. This attack subsided, and in the course of a few weeks she was as well as she had been before the relapse. In the latter part of March following there was complete arrestment of the purulent fluid. In April I carefully examined her, when not a trace of the pelvic swelling existed; the figure was perfectly erect, she looked stout and healthy, and expressed herself as being quite well.

This phlegmonous inflammation of the interstitial or areolar tissue of the pelvis and abdomen was known in ancient times, as Aëtius and Paulus Aëgineta recognise the disease. The older authors, such as Mairiceau, La Motte, and Baglivi, record the affection. In the latter half of the last and in the beginning of the present century, Puzos, Levert, Smellie, Hunter, Denman, Baillie, and John Clark, described it; and, latterly, Christison, Lever, and Charles Bell have written able memoirs on the subject. It has received various appellations, such as *abscessus mesenterii*, *abscesus*

abdominis, dépôt lacteux dans l'hypogastre, engorgements lacteux dans le bassin, iliac abscess, pelvic abscess, abscess of the ovarium, abscess of the uterine appendages, and pelvic cellulitis. It far more frequently occurs in married than in unmarried women. It is most prone to happen in primipares, and from the ages of eighteen to twenty-five. When it comes on in a primary manner, it is mostly consequent upon cold; but it may come on from fright or some sudden shock given to the system. It is often the complication or sequel of peritoneal inflammation in the puerperal state. Its early existence, then, is apt to be overlooked, because it resembles after-pains; and it may have made considerable advancement when the lochia are not suppressed, and when the mammary secretion is not interrupted. In the single, as connected with catamenial irregularity, it is seen in the strong and plethoric, as well as in the attenuated and anæmic. The sudden arrestment of the monthly period is a common circumstance of its causation. The primary symptoms then, as in the above mentioned case, are abrupt, acute, and persistent. The pain comes on at the first in a spasmodic or intermittent manner; the intervals of ease are of shorter duration, and ere long the pain is constant. It is located in one or the other of the iliac fossæ; it radiates towards the umbilicus, the pubes, or epigastrium, and is augmented by pressure. Hysterical hyperæsthesia is often also present. The pulse, respiration, the tongue, and the bowels often evidence peritonitis, which may be local or more diffuse. The decubitus is on the back, and the leg of the affected side is drawn up. Inspection shows a rounded puffiness over the ovary. When the acute symptoms have passed, the diseased side remains swollen, and the integuments are thick and brawny; the upper part of the thigh looks large and unshapely; and in the course of time, sometimes in twenty-four or thirty-six hours, shiverings and flushings indicate the suppurative change. Tension, weight, and throbbing are experienced. Examination discovers the elevation of the os uteri normal. The matter finds its exit by various channels—by the vagina, rectum, through the abdominal walls, by the bladder; or it may form a vesico-uterine or a vesico-rectal fistula. I saw a case in which the matter found an opening between the crest of the ileum and the umbilicus.

The chief diseases with which this complaint is liable to be confounded are when it occurs in the unmarried organic disease of the ovary and perityphlitis. Sciatica has also been mistaken for it. In the first named, the absence of acute symptoms and a more clearly defined tumour will be our guide. In perityphlitis, the previous constipation, the evidences of cæcal impaction as ascertained by palpation and percussion, and disease of the parietes of this part of the bowel, in addition to the general history and objective symptoms, will conduct to a right conclusion. And, on careful examination, sciatica ought never, as it has been, to be taken for pelvic cellulitis. In psoas abscess, the indications of that ailment will point to the correct recognition. When the matter chiefly

accumulates within the pelvis, the tumour thus formed may exert such pressure upon the rectum as to interfere with defæcation and flatten the dejections; or, the bladder may be so pressed upon as to be followed by painful and long-continued dysuria. The treatment should have an important reference to the free evacuation of the matter. When it is formed in the abdominal walls, graduated pressure can be applied, and is most beneficial. The general powers of the system should be sustained by mineral and vegetable tonics, a nourishing diet, and stimulants. Change of air will often complete the recovery.

XII.

APOPLEXY.

PATHOLOGISTS regard apoplexy as occurring in three forms, namely, the sanguineous, the serous, and the nervous descriptions. Two of these examples are referrible to the first-named kind, and in each a chief factor was organic disease of the heart. Both present features which show the correlation which there is between cardiac and cerebral change. I was hastily summoned to a lady who was reported to be in a fit. This lady had previously been under my care, was married, fifty-eight years of age, and had had one child. She was a person of florid complexion, muscular, and well-built. She had had two paralytic seizures during the two previous years. From a prior knowledge of her case, I felt convinced that for a long time organic changes had been going on in the head. The pupils were often contracted; she frequently complained of frontal pain; her memory had latterly become defective; she forgot the names of persons and things; she would ask the same question in repetition, stop in conversation for the needed words, and forget the terminable syllable of compound words. Her natural disposition had altered, little trifles rendered her irritable, and her nearest friends had marked this change in her character. The appetite had at times been capricious; the bowels were apt to be confined; and she was liable to attacks of biliousness, which generally succumbed to the ordinary treatment. Her pulse was always regular, but felt jarring under the finger. She had travelled much on the Continent; and when journeying from place to place she always fancied her health improved.

On my arrival she had been placed in a chair, and at the first moment recognised me. She had taken her breakfast as usual, and was seized in the grounds adjacent to the house, whither she had gone for a walk. There was when I saw her great strabismus; the thumb of the right hand was spasmodically contracted upon the palm. The left angle of the mouth was drawn up, and the left cheek contracted. The right arm had dropped by the side, and the right leg was powerless. She was treated by diffusible stimulants and counter-irritation. Calomel, terebinthinate injections, and sinapisms, were employed. The head was cool.

Soon after I saw her she passed into coma. She lay on her back, with eyes closed, breathing heavily, and never again became conscious. The bowels were freely opened. On the following day, Sir William Jenner saw her with me, and concurred in the opinion I had given that she would not recover. He suggested a continuance of the treatment. On the second day after the attack she opened her eyes and attempted to articulate, but could do so only imperfectly. She continued to lose ground. She had stimulant and nutritive enemata. The breathing became more stertorous; the legs were becoming colder, and the pulse was intermittent. She took a few teaspoonfuls of soup, but there was so little power of deglutition that these attempts were discontinued. On the third day the end was approaching. The breathing became still more stertorous; the bronchi were surcharged with mucus; the countenance assumed a venoid, leaden hue; the surface became bedewed with a clammy sweat; the sphincters relaxed; and she gradually sank—seventy-six hours after the time of seizure.

Being requested to examine the body, I made the autopsy seventy hours after death.

Thorax. The left lung was adherent by old bands of adhesion; the parenchyma was normal. The right lung was dark and congested; and, on section being made into its substance, much dark fluid gore followed the knife. The right ventricle of the heart was throughout its extent firmly grown to the pericardium, and it was with difficulty that it could be detached. The intervening concretion was whitish grey, albuminoid, and like some of the non-vascular white textures. Both ventricles were of natural thickness, did not feel soft, and were but a shade paler than normal.—*Abdomen.* All the organs, the renal excepted, were healthy. The capsules of both kidneys stripped off with morbid facility. Both kidneys were slightly granular, dark, and somewhat congested. The pyramids were not frayed out. There was no deposit of fat in the pelvis or calyces. The cortical substance was of normal thickness.—*Head.* On the removal of the calvaria, it was found adherent to the dura mater. The encephalic mass was red and injected. The convolutions and sulci of both hemispheres were large and deep. There was no subarachnoid effusion; but six drachms of reddish serum were obtained from the lateral ventricles. The centrum ovale majus exhibited numerous bloody puncta. The base of the brain was vascular; no depositions of lymph. A large black clot, of the size of a prune, was found in the left corpus striatum; and it was enveloped in an exceedingly delicate transparent membrane. The white substance in the neighbourhood of the clot broke down readily under pressure; in some parts it was semi-diffuent. The optic thalami were soft; the velum interpositum and choroid plexus vascular.

Microscopical Examination.—Heart. The fibres of both ventricles were not broken, nor cloven. Numerous shining dots, with

shady margins—oil-molecules—lay scattered, and also in contact with the inner surface of the sarcolemma.—*Kidneys.* The cortical substance of both organs showed resplendent granules.—*Brain.* The cerebral substance in the vicinity of the clot was broken up; there was abundance of the *débris* of broken-down cells. Resplendent molecules were interspersed, and orange-coloured pigment was apparent. Two small arterial twigs were distinctly seen to have undergone the fatty change.

As usual, the lesion was on one side of the brain; the hemiplegia on the opposite side of the body. The marked rigidity of the voluntary muscles on the right side was an indication of softening. The inspection confirmed the diagnosis. Blood-letting could have been of no service in this case; it could not have arrested the arterial decay. The fatty waste was the remote cause of fatal lesion. The destruction of brain-tissue was from the supply of nutrient blood being cut off; the effusion, and pressure, and death, from arterial degeneration and arterial rupture. Though I do not hold with that sweeping abandonment of the lancet which is the fashion of the time, yet in cerebral softening blood-letting can only be harmful; and when there is sanguineous effusion, it in the majority of instances hastens the fatal issue. I may briefly remark, that the hæmorrhagic clot is found most frequently in the corpora striata. Physiologists at one time asserted that the disruption of the corpus striatum was *always* followed by paralysis of the arm, and hæmorrhage into the optic thalamus by paralysis of the leg; but the accumulation of facts has disproved these statements. I ascertained that this lady had had but one attack of acute rheumatism during her life, which was at the age of eighteen, and when doubtless the pericardial adhesion took place. If such were the case the heart for the long period of thirty-eight years had over a large extent of its surface been adherent, and yet its functions had been performed. I believe that cerebral softening may commence much more remotely than is commonly supposed. I can call to mind instances in which it is extremely probable, as evinced by loss of memory, or some other change or mental peculiarity, that ten or a dozen years passed away before the fatal termination succeeded the beginning of decay. In gouty patients, when the affection is retrocedent, the suppression of the articular symptoms is sometimes followed by serous or congestive apoplexy. The sudden and unexpected occurrence of delirium would in the instances named cause fear as to this result. The gouty inflammation is transferred to the cerebral membranes, and effused products and vascular turgescence or ruptures come on as the consequences. It is possible that deposits of urate of soda may cause blockage in the arteries of the brain, when serous exudations or absolute sanguineous effusion may eventuate.

The next illustration is one of much interest. A short, well-built, and muscular man, aged sixty-three, was found, in a state of insensibility, having fallen off the seat of a water-closet. He was at

once brought to the hospital. His occupation had been that of a fly-driver, and he had been of intemperate habits. On admission the face was very red, and the countenance was full and congested. He seemed to feel when his hands or legs were touched, and he moved his limbs. The eyes were closed, and the pupils were equal and acted to light. The left sixth nerve was paralysed, which produced squinting inwards. The breathing was about forty per minute, and there was no stertor. The pulse was ninety, and soft and compressible. Temperature ninety-nine. No sweating. He had ten grains of calomel. Hot water and sinapisms were applied to the feet and legs, and ice to the head. On the following morning there was profuse diaphoresis. Pulse one hundred; temperature $99\frac{2}{5}$. Extremities warm. Motions and urine had passed involuntarily. He had spoken, but not coherently, nor did he recognize any of his family. Eyes closed: no squinting: pupils still equal, and both acted to light: moved arms and legs; could swallow, and no albumen in the urine. In the evening pulse one hundred; temperature one hundred; and continued to sweat profusely. Motions and water still passed unconsciously; stertor had come on in marked manner, and he was evidently sinking. He died thirty-eight hours after the attack.

On inspection forty-four hours after death the rigor mortis was considerably pronounced. The skull-cap came off with great ease; the dura mater had no loss of polish, and the arteries felt harder and less elastic than normal. The pia mater was much engorged with black blood. Four ounces of blood escaped from between the base of the skull and brain, chiefly from the right side, and half a pint of sero-sanguineous fluid filled both lateral ventricles. The lungs were somewhat emphysematous, but otherwise healthy. The heart was considerably enlarged; both the ventricles were greatly hypertrophied, the walls of the left being more than eight lines thick. Aorta and aortic valves healthy. Mitral valves abnormal and partly represented by fleshy nodules. Liver and kidneys presented no notable changes. Structural changes in the walls of the arteries of the brain as the sequences of endo-arteritis deformans are doubtless the most frequent fundamental cause of this complaint. The fatty transformation in the cerebral vessels is a common kind of lesion which is followed by fragility of the coats and their ruptures. There is no doubt that aneurism, of the basic arteries more especially, is far more usual than is generally supposed. The walls of these arteries are relatively thinner than other branches of their calibre, and the vessels have less external support than other branches in the systemic distribution. We are now aware that renal disease, by the spasmodic tension of the arterioles causing an increase of cardiac propulsive power, and thus producing cardiac hypertrophy, often enters into the causation of this affection. The more recent researches of microscopical anatomy have thrown much light upon these morbid phenomena, which eventuate when there is the coincidence of cardiac and cerebral lesion. In the fatty decay, when the sarcous elementary substance

is more or less substituted by oil molecules, there is less of ventricular power, and thus in an indirect manner cerebral hyperamia eventuates, and under a temporary plethora, as from a large meal, straining at the stool, which had evidently been the fact in the second of these two examples, or under some excessive muscular effort or exertion, there may be the effusion of blood. We are now more than ever convinced that in chronic alcoholism stiffening and rigidity of the arteries of the brain is one of the probable pathological conditions to be looked for. In valvular disease so commonly the sequel of acute rheumatism, and from the more tardy heterogeneous alterations of these parts in age, a compensating augmentation of systolic effort is needed to overcome incompetency and obstruction. Excentric thickening is then gradually assumed, and the arterial current becomes driven with a greater impetus into the cerebral vessels, and hence such increase of propulsion, and more especially when there are brittle tunics, forms the apoplectic catastrophe. The correlation between such antecedent and underlying conditions is now far more commonly taken into account in diagnosis than was formerly the case. It constitutes one of those many sequential trains of reasoning, which the profounder study of pathology and the better acquaintance with a minute knowledge of elementary structures render more intelligible, and which can with greater exactitude be brought to bear in the elucidation of morbid phenomena. Indeed, one of the distinguishing characteristics evolved from more precise clinical observation and the clearer conception of fundamental changes in diseased parts, is the obvious and broadly acknowledged fact, that there is a more subsistent and intimate relation between what were regarded as separate and distinct diseases, than nosologists heretofore had imagined. And these remarks are particularly applicable when speaking of the co-existence of cardiac and cerebral lesions.

Valsalva, Morgagni, Testa, Portal, and other writers have noticed diseased connection between the heart and brain. Bertin and Bouillaud have prominently insisted on the fact. Rokitsky admits the subsistent relation between excentric hypertrophy and cerebral apoplexy, but he regards a friable state of the cerebral arteries to be the necessary concomitant. Andral believes in the direct connection between hypertrophy and apoplexy, without instancing vascular degeneration. Hope found that out of thirty-nine cases of apoplexy, in no less than twenty-seven was the heart diseased, that being in very nearly three-fourths of the instances which he gave. The last-named authority asserts that before he had investigated this matter, physicians had not sufficiently expatiated upon this fact. He pointed out that on examining ten cases of apoplexy which occurred between the ages of seventy and eighty, in seven the heart lesion was ossification—valvular change—and in the examples between the ages of forty and fifty the cardiac lesion was generally in the muscular structure. There is often hypertrophy of the left

ventricle. Of six cases given by Eulenburg, in five there was cirrhosis of the kidneys and heart hypertrophy.

The next illustration is one in which the disease occurred in advanced age, and in which moderate depletion not only seemed to have done no harm, but in which by mechanically at once relieving the embarrassment of vital organs appeared to have beneficial effect.

I was hastily summoned in consultation to a case of what I considered a good example of the above description of disease. The individual was a gentleman between sixty and seventy years of age, stout and muscular, who had been paralytic a year previously; for, remarkable to say, exactly twelve months from that day he was struck down in apoplexy, which left paraplegia of the left side. This gentleman throughout life had been a man of active business habits, and constantly engaged in large monetary transactions. Having acquired a handsome fortune, he retired into private life, soon after which he had the first fit, but after that attack he so far recovered that he had determined to resume his former calling, the monotony of retirement being felt so irksome. About eleven o'clock in the morning he was found lying on the floor, in what was conceived to be a dying state. A few minutes previously he had been seen by some of the inmates, and was then, to all appearance, in wonted health. On my arrival he was in bed; the general practitioner who had first been called, and who had been in attendance half an hour, had bled him to twelve ounces. The pulse was of large volume, and quick; the pupils contracted, much convulsive action of the muscular system, the head not very hot; the face, neck, and chest cool and bedewed with a copious perspiration. The gentleman in attendance very properly said, that although the pulse felt as if it were a bleeding pulse, yet further abstraction was the question. I did not hesitate, after even a cursory review of the symptoms, to give it as my opinion that no more blood should be drawn, but in preference recommended powerful counter-irritants. Sinapisms were quickly applied to the thighs, calves of the legs, the nape of the neck, and along the whole course of the spine, with hot bottles to the feet. An injection, with an ounce of turpentine, and two drachms of the compound spirit of ammonia, in half a cupful of starch gruel, was quickly administered, but only for a moment retained, as the sphincter was quite relaxed. Soon after the mustard plasters were applied, the unwelcome symptoms began to disappear, the pupils became larger, breathing more natural, countenance improved, and pulse softer. As the bowels had not been moved, it was agreed to administer an enema similar to the last, but in a quart of gruel, which was retained. In the course of a couple of hours he was so greatly improved, as to be considered out of danger. Now, in this instance, I have little hesitation in thinking, that if the surgeon had allowed the blood to flow until he had "thoroughly lowered the pulse," the symptoms would have become

more formidable, or perhaps the patient would have rapidly sunk, because, as observed in the text, this I considered to be of that description of apoplexy in which there is considerable prostration of the nervous system, as evinced by the copious perspiration. In a stout, broad-chested individual like this gentleman, it was desirable to relieve the congested lungs and over-loaded heart, but in so doing the greatest caution was requisite, seeing that Scylla and Charybdis were on either side.

XIII.

PLEURITIC, SEROUS, AND PURULENT EFFUSIONS.

INTRODUCTORY REMARKS.—Effusion into the pleural cavity, as the sequel of one or another form of disease, is by no means of uncommon occurrence. Formerly, and most especially before the physical signs of thoracic complaints were known, as now they are known, liquid accumulations in this serous sac were often not recognised; and, it is no exaggeration to say, that innumerable patients were lost, who, had they lived in these days, would have been saved, and restored to health and comfort. There are few instances in the practice of medicine in which a rightly directed treatment, and sometimes in which instrumental means, can be so fully and so manifestly brought effectually to bear. When the effusion is detected in notable quantity, it is most frequently the product of inflammation of the pleural membrane, and very generally such inflammation has been, and may continue to be, of the subacute or latent form. Large quantities, however, of fluid sometimes collect in this sac, in an active, passive, or mechanical manner, without being preceded or attended by inflammatory products, when it is mere hydrothorax; but it may be observed, that hydrothorax is usually a double, and not a single, pathological condition, and the sequence of serious organic disease of the heart or great vessels, or it may be of renal degeneration; and when it obtains, the circulatory and respiratory functions are so interfered with, that dyspnoea and threatened orthopnoea become prominent symptoms, as evinced by facial lividity and anxiety, clammy perspiration and coolness of expired air. The sequels now about to be considered, and illustrated by several examples, are chiefly those forms which originate from the inflamed serous membrane lining the chest, and which, as the rule, occupy but one cavity of the thorax, and, it may be added, more especially the left side. Double effusion, from such cause, does sometimes occur, but very exceptionally. Effusion may result in the sthenic types of pleuritic inflammation, in those which are of the fibrogenic character. The more plastic materials are then thrown out and serous exhalation is in less marked degree; but these types are far less common than those in which the exudates are mostly serous or sero-purulent, and, conse-

quently, not formative, if the intercurrent and localised examples of pleuropneumonia or pulmonary phthisis be excepted. The changes which come to pass within the chest are mainly influenced by the relative proportion of the coagulable or albumino-fibrous parts, in some acute forms of pleuritis, and relatively with the degree of plethora and high vitalism of the patient, the plastic products are disposed to become organised, and the contrary is the fact, as, in a low and depressed organism, fluidity then becomes the significant event.

Again, the part of the thorax which is the seat of primary lesion determines, in marked manner, the kind of result which eventuates. In the upper part of the pleura, opposing surfaces are in more immediate contact, hence the common prevalence of adhesion at that situation; and as liquid effusion naturally gravitates into the lower portions of the pleural cavity, it is thus that the pleuræ are kept apart, and that the depending situations are prevented from adhesion, and that there the first signs of effusion are presented.

The ancient and older physicians knew little more than two symptoms indicative of pleural effusion. They mainly relied upon Hippocratic fluctuation, and inability to lie on either side. The modern means of diagnosis have conferred great certitude in the detection of its presence. The subjoined examples will show that, in many instances, there is a great and salutary tendency in the way of absorption, and I believe that this tendency can be much aided by the timely use of suitable agents, and by placing the patient under a judicious general mode of treatment. It is, however, a fact, which need hardly be insisted upon, that, in many cases, other methods are imperatively demanded for the removal of the fluid, or a fatal termination would inevitably ensue. Sometimes nature indicates the mode for adoption, by spontaneously giving an exit to the long-pent-up secretion (empyema of necessity); but nature's process is slow and tedious, and the relief should be anticipated. In scarcely any examples of this affection is it possible to correctly pronounce the kind of fluid which is effused; it may be simply serous, sero-purulent or absolutely purulent. Various combinations of the plastic and liquid exudations are discovered in the same subject, and there is no doubt that the exudation, which at an early period is serous, may from consecutive and vascular changes in the membranes, or from a more general alteration in the vital fluids, become purulent when no air whatever has been admitted into the cavity, precisely as pus is sometimes secreted in the other great serous cavity, that of the abdomen.*

Latterly, much has been written, and great light has been thrown on the nature of this affection, and it is now beyond dispute that these collections within the chest walls are not to be regarded with so much dismay as they once were, and that the disease is far more amenable to a rational and properly selected treatment. In the

* This pathological fact I have more fully dwelt upon in the article on Peritonitis.

following cases it will be seen that large quantities of effused fluid can be absorbed, and a full recovery eventuate. It has also been, during the last few years, amply shown that the drawing-off of the fluid can, in very many instances, be had recourse to, not only without any of the risks which formerly were entertained, but with the best effects.

CASE I.—Not long ago, I was summoned into the country to see a lady who had just returned from a visit in the north of England. This lady was a thin and delicate person, sixty-five years of age, and for many years she had not enjoyed good health. During this visit to the north, she had a severe attack of pleuro-pneumonia, and had been treated by two physicians of local celebrity. As soon as she could bear the journey, she returned home. When I saw her, she complained of shortness of breathing; she said it distressed her to go upstairs, and that even the motion of her carriage gave uneasiness. The lower two-thirds of the right thorax showed enlargement; the intercostals were tense, and she could not lie on her left side. There was marked dulness on percussion up to the angle of the scapula. On the application of the stethoscope, there was no vesicular murmur over dull area, but over that area there were tubular breathing and bronchophony. The line of dulness varied on the movement of the trunk. The pulse was accelerated and the digestion much impaired. She was treated at the first by blisters, mild alteratives, iron, and quinine, and cod-liver oil. After the blisters, the full use of iodine externally was employed. She was eleven weeks under my care, and made a full recovery.

Thoracentesis was not insisted upon as absolutely requisite in this case, although I would have recommended the operation if the same physical signs had been presented in some other patients. This lady was of extremely nervous temperament; her friends were very averse to any instrumental interference; and I was earnestly requested to try such means as might produce absorption.

CASE II.—A man, aged thirty-seven, a labourer, was admitted into the hospital. He was a tall and powerfully built man, who had usually enjoyed good health. Before his admission into the institution, he was under the care of our house surgeon, Dr. De Havilland Hall, for a dangerous attack of pleuro-pneumonia. I then saw him with Dr. Hall, and, for a time, his recovery was very doubtful. When he came into the infirmary, there were all the general symptoms and physical signs of pleuritic effusion. Inspection showed the right chest to be larger; it measured more than the left; its contour was smooth and bulging. Percussion elicited a dull, dead sound over the lower two-thirds. At the subclavicular and supraspinous fossa regions, there was excessive resonance. Auscultation gave tubular breathing and bronchophony over the dull area. He could not lie on the left side. There were dyspnoea, increased by exertion, accelerated pulse, and an anxious facial expression. He was treated with blisters, iron, quinine, and, subsequently, iodide of potassium internally, and the

application of iodine externally, in the proportion of one part of the tincture of iodine and three of water. He was discharged cured, having been eight weeks in the hospital.

This man having all the appearance of possessing a vigorous and an unimpaired constitution, I resolved, for a time at least, to try the process of absorption. He soon began to improve; and, with the progress he made, the idea of paracentesis was discarded. Dr. Hall saw him a few weeks after he left the hospital, looking robust and healthy; and the man declared he had never felt in better health.

CASE III.—Mr. R. came to consult me for, in his own words, “difficulty of breathing and a weight on his left side.” He was a healthy, robust-looking man, upwards of sixty. He told me that, a few weeks before, he had had an inflammation on the chest. The nature of his complaint was at once obvious. There was bulging of the left side, it measured more than the right; the apex-beat was felt beyond the middle line of the sternum; there was that absolute dulness denoting fluid. Over a large space, there was no vesicular murmur, nor vocal fremitus, and, at the interscapular space, the voice was bronchophonic. The right chest was super-resonant, and the breath-sound exaggerated. He was twice blistered, had iron, quinine, and cod-liver oil, and iodine was applied externally. He was requested to live well, to take four or five glasses of port wine a day, and to keep as still as he possibly could; not to walk, nor to ride on horseback. He made a rapid and full recovery. At the end of five weeks, he ceased coming to consult me.

CASE IV.—A fresh-coloured young man, aged twenty, was admitted into the hospital. He had had pleurisy, and he came to the institution for difficulty of breathing, and pains and weight in the left side. The history of his case, the general symptoms and physical signs, left no sort of doubt as to the presence of pleuritic effusion. He was treated like the foregoing patients, but, in addition, he had the iodide of potassium in the decoction of broom tops. He was discharged at the end of two months with very little dulness remaining, and which, it is probable, was consequent on some adhesion of false membranes.

CASE V.—A man aged twenty-seven became an out-patient under the care of Dr. Hall. He complained of difficulty of breathing. On auscultation, there was friction sound at the angle of the left scapula, and dulness towards the thoracic base. Ultimately, three-fourths of the left chest was dull, and there were all the accompanying and common signs of effused fluid at the time I saw him with Dr. Hall. The external application of iodine was applied in the manner recommended to me by Dr. Fuller. The entire dull area was painted over with the tincture of iodine, diluted in the proportion of one of the tincture and seven of water. The half of a waistcoat was made with two thicknesses of new flannel, and one of calico-cloth, and this was continually worn. At the end of five weeks, the dulness had disappeared, the fluid had become entirely absorbed, and he was quite well.

CASE VI.—A discharged soldier, aged twenty-one, was admitted as an in-patient. The features were drawn and bloodless; he looked extremely ill, and as if affected with some fatal malady. The simple exertion of walking rendered his breathing quick and laborious. He began to have a cough and chest affection, and had been treated at the respective stations of his depôt, which were Chatham, Bradford, and Manchester. When at these places, he had had cough mixtures, but had no poultices, blisters, or other remedies. In fact, the nature of his illness had not been discovered. His chest had never been examined. He was discharged the service, and returned home. On admission, he was much emaciated, and the skin was harsh and dusky. Inspection showed the right thorax larger than the left. It measured an inch more than the other side. The præcordial impulse was felt over an abnormally large area. The apex beat was to the right of the mesial line. Percussion at all parts of the left chest gave a short, dull, dead sound. There was no tremor imparted by the voice to the flat hand. Percussion over the right thorax gave abnormal resonance, and vocal fremitus could everywhere be felt. On the application of the stethoscope to the left chest, it was almost silent; even so high up as the subclavicular spaces there was no vesicular murmur. At the superclavicular and interscapular regions, distant tubular breathing was alone heard. There was supplementary breath-sound over the right chest, and there, at several places, the murmur was puerile. He had a loud, dry, barking, incessant cough, which no remedies seemed to alleviate. Pulse 120; respirations 35; temperature 97; and the digestive functions were much impaired. Shortly after his admission, my colleague Mr. Marsack kindly, at my request, introduced a trocar between the fifth and sixth ribs, but no fluid came away. I still, however, gave it as my opinion that a large quantity of fluid existed, notwithstanding that pyogenic membranes, or absolute pulmonary adhesion, prevented its escape. The kind of treatment before described was used, but with no benefit. He became anasarcous, and, the end being obvious, he wished to return home. He was discharged, and died at Tonbridge a few weeks afterwards.

Mr. Cleveland Smith very kindly sent me an account of the necropsy. The left pleural cavity contained between three and four pints of inodorous straw-coloured serous fluid, and the pericardium nearly a pint. In the right pleural sac there was a small quantity of effusion. The left lung was small and consolidated. It was adherent to the chest wall. The superior lobe was friable, and readily broke upon pressure, when vomicae, containing pus and tubercular deposit, as revealed by the microscope, were discovered. The right lung was not diseased. The heart was normal, and the pericardium non-adherent. This man's case was very illustrative of that low and insidious form of thoracic effusion which is not infrequently associated with tuberculosis. The pleura takes on a masked form of inflammation, and copious exudation becomes a prominent sequent.

CASE VII.—A married woman, aged forty, and who had eleven children, was admitted into the hospital. She had had pleurisy three months previously, and, on admission, there was great dyspnoea; the breathing was much accelerated on the least motion, the features were pinched and careworn, and she looked extremely ill. I shall not stop to give her symptoms and the physical signs in detail, but shall merely add that there were the broad and very apparent characteristics of effusion into the left pleural sac, the apex-beat being felt beyond the right sternal margin. Dr. Hall, at my request, introduced a trocar at the sixth interspace. Sixty-three ounces of clear greenish straw-coloured serum were drawn off, to the patient's instant and great relief. That evening she could lie on the right side, which she had not been able to do for several weeks. For some days, she appeared to progress favourably; she then, without apparent cause, became worse, and gradually sank. Inspection was not allowed.

This case, like the last recorded, it is exceedingly probable, was one of which tubercle was the cause. Her emaciated and general appearance pointed to a chronic and wasting disease.

CASE VIII.—A little girl, aged ten, was an out-patient under the care of Dr. Hall. She had scarlet fever, which was followed by scarlatinal dropsy. The urine contained a very large quantity of albumen. There were also numerous casts, epithelial cells, and blood-discs. She had acute pleuritic pain in the right chest, and dulness and effusion eventuated. The respiration became most distressing. Thirteen ounces of purulent matter were drawn off; Dr. Hall again introduced the trocar, and twelve ounces of thick creamy pus were taken away. The child received momentary relief after each operation.

I prognosticated that the effusion in this case would be purulent, because it was the sequel of scarlet fever, and in a subject affected with renal poisoning. She afterwards died of uræmia.

CASE IX.—I was called to see a young lady, aged fifteen, who was in acute rheumatism. She was placed in blankets, and the alkaline treatment was prescribed. The large joints became swollen. There were no cardiac symptoms, and, at the end of three weeks, she was convalescent. She then had a chill, the fever returned, the large joints again swelled, the temperature rose to 104, and very serious peri- and endo-carditis supervened. There were extensive effusion into the pericardium, pleuro-pneumonia and great effusion into the left chest, with renal affection, being also the complications. For some time this young lady was in extreme peril. She slowly made progress towards amendment, and the graver symptoms subsided. She was blistered. She took the iodide of potassium; the iodine ointment was sedulously used; and she wore the half-waistcoat before described. All dulness vanished, both at the cardiac region and in the left chest. The breath-sound could be heard to the very base of the lung. The only trace of her dangerous illness was a slight systolic *bruit*. That passed off.

CASE X.—I was sent for to see a young gentleman, aged twenty, who was pursuing his studies at an establishment in the country. He was a tall, broad-chested, and powerful young man. He looked pale, sickly, and depressed. He had had pleurisy. He told me that since that illness his breathing had been affected. He complained that he could not walk quick, go up a hill or upstairs, without difficulty, and that he could not lie on his right side. There were all the characteristics of left chest effusion. The dulness was most distinct. The apex-beat could be felt at the middle line. I suggested thoracentesis. His tutor and himself begged that a trial might first be given to medical remedies. He was treated as before described. He had iodine tincture diluted with seven parts of water applied with the half waistcoat. A generous diet, wine, and quiet were recommended. He made a full recovery, gained a stone of flesh.

CASE XI.—I was requested to visit A. T. When I arrived, I was introduced to a gentleman seated up in bed. He was a large, broad-chested man, aged thirty-five, who had not particularly the aspect of an invalid. He told me that he then held an official position in London, but had been obliged to absent himself for a time from his duties. He said that, in former years, he had had great powers of endurance; that he had, at twenty years of age, commanded an expedition of seven hundred men up the Nile, when he went through great exertions. He had been in a cavalry regiment in India. He had an attack on the chest, for which he was blistered. After that illness he went to the hills; but this chest attack had left difficulty of breathing, a frequent feeling of suffocation, and a proneness to syncope. He relinquished his military position and came home. On his return, he looked better in the face than his friends expected. They doubted that his retirement had been imperative, and much family misunderstanding ensued. He consulted two London physicians of eminence. One said little was the matter except a weak heart. The other declared, as the patient left his consulting-room, "that from head to foot he was as sound as a bell." He was subsequently under the care of a well-known physician in a fashionable watering-place, and also the family surgeon in town.

I percussed him beneath the clavicles, and there was perfect resonance. I then applied the stethoscope, and the vesicular murmur was distinct and clear. I placed my flat hand at the præcordial region, but could feel no impulse. I desired him to strip. There was bulging of the left chest-walls. The sides of the thorax were not symmetrical. Further investigation proved all the physical signs of left chest effusion. Its surfaces were smooth and even, the dulness was absolute; it was the kind of dulness which fluid alone can give. There was no fremitus nor vocal resonance. The respiratory sound was abolished. The breathing was tubular, faint, and distant; the apex-beat was lost, and mensuration added to the testimony of effusion. In this assemblage of facts there could be

no doubt in diagnosis. The right chest was hyper-resonant, and the murmur exaggerated.

I told this gentleman that his dyspnœa, his ability to lie but on one side, his faintings, and the fatigued, done-up condition which followed his office hours, were and had long been caused by the presence of a large quantity of fluid on his chest. He was astonished—incredulous! No such opinion had ever been given. I replied that such was beyond all doubt.

This, to him, strange opinion having been expressed, it was by the desire of his family arranged that Dr. Fuller of London should meet me. He confirmed my diagnosis in each and every particular. He said to the patient's friends, "I believe there are not less than three pints of fluid in his chest; and agree with the opinion of Dr. Wardell, that fluid has been there three years, since when he had inflammation in his side in India." Dr. Fuller advised paracentesis. I asked my colleague Mr. Rix to meet Dr. Fuller and myself. Mr. Rix introduced the trocar at the fifth interspace; no fluid escaped. Adhesion, pyogenic membrane, and lymphic deposit, doubtless prevented the liquid from being reached. Iron, quinine, cod-liver oil, and the external application of iodine, and the half-waistcoat, were ordered.

In the course of two or three weeks, his respiration was easier and the physical signs were improved. After having been under my care two months, he left Tunbridge Wells very greatly benefited, but with some fluid still unabsorbed.

Afterwards I received a telegram to meet Sir William Jenner and the general attendant at a consultation in London. The patient fancied he was not so well. To my own astonishment, the left chest was resonant almost to the base; there were friction-sounds and coarse crepitation where before nothing could be heard; and the apex-beat was now distinct beneath the mamma. Sir William said "there had, beyond doubt, been recent and great effusion; that some small quantity of fluid still remained; but he believed it would all be absorbed." At the request of the family, he put his opinion in writing. The patient had at this date resumed his official position; he could lie on either side, and had gained flesh.

A. T.'s last note said: "I have now been so long at work, and through such severe weather, without feeling worse, that I hope I am *out of the wood*. Until yesterday, I pursued the iodine treatment as prescribed by you. My doctor examined my chest a week ago. He then said he was perfectly satisfied that the fluid has now quite disappeared." This gentleman went to the West Indies to fill an official appointment; and a member of his family wrote to me some time ago, and stated that he continued well. This patient called upon me three years afterwards. He looked and was extremely well. I most carefully examined his chest, but could not detect a morbid sign or sound.

It may, and very properly, be asked, why it was that two hospital physicians, both occupying a distinguished position, should have

overlooked the real conditions of this gentleman's case. He went to their consulting-rooms; he was an erect and muscular man, and his features did not plainly indicate the extent of disease under which he laboured. Percussion beneath the clavicles gave no dull or doubtful sound; unfortunately, they did not examine the chest posteriorly and to the base; and I believe the patient did not sufficiently impress upon them his inability to lie but on one side, and the oppression which he experienced.

CASE XII.—A maid-servant, aged twenty-two, a thin and an extremely pale-looking young woman, was admitted into the hospital. She had been several weeks ill, and her case was regarded as one of consumption. It was ascertained that her illness commenced by an acute inflammatory attack in the chest, which had been treated by fomentations, poultices, and other remedies. She made a partial recovery, but did not get well. Her wonted strength did not return, a feeling of breathlessness was caused by even trifling excitement, and she could not lie on her left side. On admission, the conjunctivæ were blanched; great dyspnœa was produced by going upstairs, and the features showed that drawn anxious look, so expressive of pulmonary embarrassment. On inspection, the right chest looked bulging, and was evidently, as mensuration proved, larger than the left. The flat hand, passed over the surface of the right side, felt full and smooth. On both hands being placed simultaneously on the chest, tactile fremitus was distinct in the left, but absent in the right, thorax. The intercostal spaces were obliterated on the diseased side. Auscultation detected distinct tubular breathing, unmixed with any vesicular murmur, in the one back, and puerile respirations in the other. The præcordial impulse could be but faintly felt. There was no dulness at the apices, nor yet any crepitation. The case was very clearly one of effusion. As, however, the dulness at the right back did not extend higher than the angle of the scapula, I resolved on trying the power of absorption, at least for a time. The iodine and half-waistcoat were employed. She was ordered iron and quinine, and put on extra diet, with a moderate allowance of port wine. Under this treatment she began to improve. The rotund contour of the right side became less marked, the intercostal spaces more delineated, and the air could be heard weakly nearer the base. She was discharged at the end of three months, with but an insignificant amount of dulness, quite near the base, and which it was presumptive might be more owing to adhesion and organised exudation than to any remaining fluid; whilst her general appearance attested the very marked improvement which she had made.

CASE XIII.—Mrs. M., married, aged forty, never had a child, was pale, haggard, and sickly-looking. On questioning her when she came to consult me, there was a history of acute pleurisy. For many weeks she had been under homœopathic treatment, but without the slightest benefit. When I first saw her, she complained of great difficulty of breathing, accompanied by much palpitation, with a

tendency to faintness on the least exertion. Inspection showed diminished mobility in the left side; the surface on this side being smooth and even, and the intercostal spaces were wide and tense. The heart's impulse was feebly but most distinctly felt to the right of the mesial line. Percussion gave that absolute, dead, dull sound, which is alone elicited when there is fluid. Altering the position of the trunk varied the line of dulness. At the lower third of the thorax, nothing could be heard except a blowing tubular breath-sound; there was over that area no vesicular breathing whatever. All the negative and positive facts told the story of effusion. The treatment was precisely the same as that adopted in the preceding case, and this patient made a speedy and full recovery.

CASE XIV.—A man, aged thirty-eight, who had been a waiter in hotels, was admitted. He was sent to be put under my care by Mr. Wallis of Hartfield, who had very correctly diagnosed effusion. The man confessed that he had not been the most temperate of individuals, but that latterly he had taken a less amount of stimulants. At a glance, it was evident that he laboured under some grave malady. I had received from Mr. Wallis a history of a low form of pleurisy, the symptoms of which tardily declined. On admission, he looked thin in the face, and the muscular system was a good deal reduced. On being stripped, the left shoulder was lower than the right, and the left side was full, rounded, and prominent, particularly at the middle third. His breathing was quick, the pulse a little over ninety, and exertion caused breathlessness. He could not lie on the right side, and only with discomfort on the left. The dulness ascended at the left back, quite up to the spine of the scapula. There was no dulness at this apex. The right chest was somewhat preternaturally resonant, except at the apex, where there was some dulness. The heart was pushed up under the right nipple, below which its impulse could be weakly felt. The stethoscope confirmed the opinion already formed by percussion and other facts of the case; but there was moist small crepitation of the right apex, and, though pleurisy had set up the effusive tendency, there was, it was feared, incipient tubercular mischief at the top of the right lung. The man's distress was very great, and, at the end of a week after his admission, I determined on paracentesis by means of the aspirator. My colleague Mr. Marsack operated, and ninety-three ounces of a greenish straw-coloured serum were withdrawn. He had a good night after the operation, and the next day he expressed himself as being very greatly relieved, as he felt his breathing easier, and he could in fact lie on the right side. At the end of three weeks, sixty more ounces were, by the canula, taken away. From this time, he began to gain flesh, his looks improved, and the physical signs were far more natural. The moist crepitations at the right apex disappeared. Iodine was, in the manner I have before described, applied, and he took iron and quinine, and cod-liver oil, and was allowed six ounces of port wine a-day. He left the

hospital five weeks after admission, giving promise of a full recovery. I saw him a few weeks afterwards; he had walked three miles, and he looked wonderfully better. At the end of other two months, I had again an opportunity of examining him. To my surprise, he was quite erect, without the least inclination to the left side. He had gained colour, and his face looked broader. When I desired him to strip, at a glance he had gained flesh. There was no bulging of the left side. He told me, as I was examining him, that he had taken no medicine for fifteen months, and that he had been employed as a waiter at an hotel. He said he had felt no inconvenience whatever on the left side, and the fact of his having been in the employment which he described, was a sufficient proof that he could not have suffered from difficulty of breathing. I percussed him carefully. Some dulness remained in the lower half of the left chest, but it was not the absolute and characteristic dulness which denotes fluid, notwithstanding that the true pulmonary note could not be elicited. I regarded this loss of normal resonance as caused by adhesion and the organised depositions of lymph; and I shall hereafter point out how these thickenings by means of false membranes and organised deposits are sometimes considerable. The breath-sound could be faintly heard even low down. The heart occupied its proper place. There remained slight dulness at the right apex, with slight and sparsely scattered moist crepitation, and there was also a small cavity; but his gain of flesh and strength, easy breathing, his facial improvement and the physical signs, gave promise that full recovery of the left apex might eventuate, as we know that, in exceptional instances, a small cavity may become obliterated. The right lung would become less worked when it had relief afforded by the left organ resuming its functions: its chances of restoration became greater. It is quite conclusive from the case and sequents of this man, that tapping was of immense benefit, if it be not positively asserted that it saved his life.

CASE XV.—A little boy, aged five, who first came under the care of the house-surgeon. He had suffered from cough and pains in the chest. These symptoms became more urgent, and the physical signs indicated an attack of pleuro-pneumonia. There was dulness at the left inferior back, accompanied with moist crepitation and subdued friction sound. He recovered from the acute attack, but did not fully regain his former health. Some time afterwards, the house-surgeon requested me to again see the child. The little patient had been for some weeks from home. When I saw him, an abscess had formed externally at the costal angle, and over the fifth, sixth, and seventh ribs, there were in marked degree all the common physical signs of thoracic effusion, and it was evident that the rounded external swelling had communicated with the cavity of the chest. An opening was made at the most prominent part of this swelling, and a probe introduced, when an aperture was distinctly felt between the sixth and seventh ribs;

seven ounces of thick creamy pus were drawn off, and with very considerable relief. He was ordered the syrup of the iodide of iron and cod-liver oil. When I last saw this little boy a fistulous opening still existed, but there was no dulness, and the breath-sound could be heard down to the base. He was directed to lie on the left side, and thus the cavity was daily emptied. The mother told me the quantity of matter had gradually become less.

CASE XVI.—I was requested to meet in consultation several years ago Dr. Day and Mr. Bishop, at Tonbridge, in the case of a young gentleman, aged eighteen, who for some time had been under the care of these gentlemen. This patient, prior to his illness, had been an unusually powerful and well-built youth, having taken seven prizes given for athletic sports at a public school. There was the history of acute pleuritic inflammation, which had been produced by a fall. At the time of my first visit, the patient was much reduced in flesh—he weighed only seven stones five pounds—was very anæmic, and looked very ill. He lay on his back, the abdomen was distended and resonant, and, on percussion and movement, it was evident that there was some effusion into the abdominal cavity. The skin was dry and harsh; pulse 90; tongue coated, and alvine dejections clay-coloured. Inspection showed the left chest to be preternaturally full and rounded; the intercostal spaces were wide and tense; the heart was displaced towards the right, and the physical signs gave unquestionable evidence of a large amount of fluid in the pleural cavity. Paracentesis by the aspirator was decided upon; Mr. Bishop performed the operation, and sixty ounces of greenish straw-coloured serum were withdrawn. He had a moderate dose of opium at bedtime, and he took a mixture with quinine and steel thrice daily, and a carefully selected diet was to be observed. The removal of the fluid relieved the breathing, and gave great relief. At the end of a fortnight, I was again requested to meet these gentlemen. Examination showed that the cavity still contained fluid. It was resolved to evacuate it, but not by means of the aspirator, because the use of that instrument required a greater length of time than the ordinary canula; and, on the previous occasion, the patient was much fatigued by being so long kept in the erect position. The flattened canula, with a piece of gutta-percha tubing, and the free end submerged in water, was introduced at the fifth interspace at the costal angle, when a pint of what seemed to be pure bright-coloured blood freely flowed out; the sanguineous character of the fluid then changed, and another pint of reddish serosity escaped; and thus, in the two operations, one hundred ounces of fluid were taken away. I saw this young gentleman twice afterwards with Dr. Day and Mr. Bishop, when gradual and decided improvement was manifest. The abdomen became reduced in size, nor was there any evidence whatever of any fluid remaining in the abdominal cavity. Percussion and the stethoscope proved the marked changes which had taken place in the thorax; the dulness had greatly declined, and the

breath-sound, as evinced by coarse crepitations, could be heard almost at the base. The improvement continued, and my services were not again required. Half a year afterwards I had an opportunity of examining this young gentleman. The change in his appearance was so great that I hardly, at the first glance, recognised him. He was then an erect, powerful, and healthy-looking young man. He could leap and run, and was full of activity. Inspection showed that he had fully regained his former volume of flesh, and at every aspect, the chest walls seemed symmetrical. The præcordial impulse was distinct at its normal site, and the tactile fremitus natural. Careful percussion could not detect a single patch of dulness; the true pulmonic note could be elicited at any point, and auscultation discovered no morbid sound whatever, except a slight amount of large and slightly moist crepitation at the base of the left lung. He told me that ten weeks after the last operation, and when he was considered to have greatly improved and to be gaining flesh, he then only weighed nine stones ten pounds, but when I saw him he weighed twelve stones and a half. This case, from having been one of very grave character, might be said to have ended in full recovery. Nothing could have been more satisfactory than the result of the two operations. At this date (March 1885), he is a strong and healthy man.

CASE XVII.—Mr. Manser of this town requested me to see with him the son of a gentleman, a little boy, six years of age, who had empyema, and who had been operated upon by Mr. Manser's partner Mr. Marsack, a short time previously, when a considerable amount of sero-purulent fluid was removed. When I saw the child, he looked emaciated and extremely ill. The pulse was quick, the breathing accelerated, and there was an unusual degree of nervous excitability. Examination showed the reaccumulation of a large quantity of fluid in the right side. Mr. Manser introduced the flattened canula, and forty ounces of purulent matter were withdrawn. It was decided to keep the opening patulous, and this was done, for the time, by means of a piece of gum catheter being inserted and persistently kept *in situ*. Afterwards, a flattened silver canular-formed tube, three-quarters of an inch long, with a button-head externally, was employed. The child every morning was turned on his side, and thus accumulation was prevented. He took the syrup of iodide of iron and cod-liver oil, and was ordered a carefully regulated diet, and wine twice daily. I was desired to meet Mr. Manser again. The improvement in the child was most manifest; he had gained flesh and colour, and in all respects seemed much better. The physical signs bore testimony to the more obvious indications of amendment. Inspection showed some contractions of the right thoracic parietes; comparatively little dulness remained, and this was at the base. The heart's impulse was easily felt at the normal position, and tactile fremitus was distinct at the right back. Coarse crepitation could be heard almost at the base. It was agreed to apply the iodine over nearly the entire

left thoracic surface, in the proportion of one-tenth of the tincture and nine of water, and by means of the half waistcoat. Mr. Marsack and Mr. Manser had very properly recommended that he should pass the winter and spring at St. Leonard's. His future progress was most satisfactory, and he fully recovered.

CASE XVIII.—The house-surgeon, Dr. Hall, desired me to see with him a little boy, six years of age, then an out-patient of the hospital. Dr. Hall had attended him for an attack of pleuropneumonia, the acuter symptoms of which he passed through favourably; but considerable dulness remained in the left chest. Examination left no doubt as to the existence of effusion. It was deliberated upon, whether paracentesis should not at once be performed. He was a strongly-made child, with well-developed muscular system, and it was finally determined to first try the effects of absorption. The diluted application of iodine, by means of the half waistcoat, was had recourse to, and he was put on iron, quinine, and cod-liver oil, and strictly ordered to be kept warm and quiet. The dulness gradually disappeared, the air again descended into the left chest, puerile respiration returned where only distant tubular breathing had been heard, and he made a full recovery.

COMMENTARY.—The above reported cases present many features of great pathological and practical interest; and they prove, as before remarked, that pleuritic effusion, even when in considerable quantity, is not to be looked upon with such dread as it was formerly contemplated. In the great majority of instances, it is amenable to treatment, and in many cases patients now make a full recovery, who would, if they had been subjected to the inert means formerly adopted, unquestionably have perished. Of the foregoing eighteen examples, twelve were males and six females. That men are more prone to pleuritic inflammation than women, most writers do not fail to point out; and this tendency of the former may doubtless be accounted for by their greater exposure to the vicissitudes of temperature, and being more accustomed to indulging in alcoholic and fermented liquors. With regard to age, three were under 10 years, three from 10 to 20, five from 20 to 30, three from 30 to 40, three were 40, and one 65; the greater number thus being in the third decade. Twelve made a full recovery, four were greatly relieved, and only two died. In one of those fatal cases (6) the gravest symptoms had shown themselves when he came into the hospital; there was distressing dyspnœa, the heart was thrust out of its position, the legs had become œdematous, and a general dropsical tendency was apparent. The introduction of the trocar, which in two places was attempted, did not reach the fluid, because, as inspection afterwards revealed, the lung was broadly adherent to the thoracic wall. If this operation had been performed at an earlier date, it would doubtless have conferred great relief to the distress under which he suffered, though it might not, perhaps, have fully arrested the progressive phenomena of his phthisical condition. The other

patient who died was a pale, debilitated woman, whose vital energies had, by previous illness, been much lowered, and she sank by asthenia rather than from any effects of the shock produced by the operation. In six, the effusion was in the right, in twelve, in the left side. All authors agree that this event is of most frequent occurrence in the last named half of the thorax. In thirty-six fatal cases, given by Hasse, nine were double (hydrothorax?), ten in the right, and sixteen in the left, side. Of fifty-six examples by Mohr, nineteen were in the right, and thirty-seven in left. Copland, Hughes, and Hamilton Roe notice the same fact of predilection for that side. MM. Rilliet and Barthez assert that, in children, pleurisy, in the uncomplicated state, is more frequent in the right than in the left side; whilst, in complicated cases, it is most frequent in the left. Again, it has been maintained that paracentesis is not equally favourable in both sides of the chest. In a work published by Aran, some years ago, he affirmed that, in right effusion, thoracentesis produces only a temporary benefit, that the fluid reaccumulates, or tuberculosis follows. Hippocrates believed more recoveries resulted from opening the left than the right side. Trousseau says he cured a large number of pleurisies with effusion in the right chest. This physician also believed that right pleurisy is very generally of tuberculous origin. Bowditch's experience in this particular is opposed to the opinion of Trousseau. The first-named writer found that, in twenty-five cases, fourteen were of the right, and only eleven of the left side. Of the former number, only one had tubercles, and in that the pleurisy was cured. The result of tapping in Bowditch's cases was, that twice as many recovered from tapping of the right as of the left side. With regard to what I have said relative to the frequency of effusion in the left thorax, it may, perhaps, mainly be explained by the fact, commonly acknowledged, that the left pulmonary apex is more prone to tubercular deposits than any other part of the lungs; and, as we know that secondary pleurisies often are followed by serous, sero-purulent, and purulent collections, thus it is that these products are most commonly found in that cavity.

In fourteen out of the eighteen cases, the average time under treatment was 59.9 days. The time, however, elapsing before recovery eventuates, is necessarily most various. This will depend upon many circumstances, such as the nature of the disease by which the effusion is produced; the kind of liquid which is poured out; the age; the amount of vital energies inherent in the patient, and, consequently, the degree of absorptional power in the system; the mode of treatment which has been selected; the period which has passed before medical agents have, or instrumental aid has, been brought to bear on the case; and the thickness, extent, and tenacity of the false membranes which have been formed. The restoration to health is doubtless far more speedy when the effusion is merely serous than when it is sero-purulent, and much more especially so

than when it is purulent. When thoracentesis is performed in empyema, the cure is often very protracted, because this kind of sequel implies a secondary or chronic form of inflammation in the serous membrane. In some cases, in which paracentesis was performed without delay—before time was allowed for false membranes to form, and bind down the lung and lessen the power of absorption—I have known recovery to be remarkably rapid. The modern practice is to tap early, and not to leave it until the powers are weakened and as a last resort. Since Trousseau advocated early interference, there has been much more boldness and decision.

As already remarked, pleuritic effusion may be unilateral or bilateral. It may, however, be observed as a rule for our guidance, that liquid in both cavities, in nearly all cases, implies hydrothorax, when there is a different clinical history, and there are different subjective and objective symptoms; and hydrothorax is signally the episode of organic and constitutional disease. It is a sequent not having foregoing inflammation, nor is it accompanied by notable febrile phenomena; it is generally, as I have remarked, traceable to cardiac or renal changes; the heart is not displaced, and there is often pericardial dropsy; paroxysms of dyspnoea or threatened orthopnoea come on; and it is generally that condition which, after long and gradual alteration of structure, supervenes as the herald of dissolution. In one-sided effusion there has, in the majority of examples, been cognisable inflammation. Not unfrequently the inflammatory symptoms have been but indistinctly pronounced, and sometimes they have scarcely been pronounced at all. But careful inquiry generally elicits the acknowledgment of there having, at an earlier date, been sharp pains, or some condition which directed the patient's mind to his chest. He will say, that about such a time he had stitch in his side, accompanied with cough; that it was regarded as being rheumatism; that he could lie less easily on one side than on the other; that he was at some particular date unwell, after which the more disturbing symptoms passed away. Or, what is far more commonly the fact, there has been veritable pleurisy in the primary or the secondary form. In seventeen out of the eighteen cases above recorded, pleuritic inflammation had preceded. Primary pleurisy may eminently be regarded as unilateral; and double effusion as the sequel of pleurisy, is, as before asserted, quite exceptional. When occurring in the left side, fluid in the pericardium may, by extension of the inflammation to the cavity of that organ, be the accompaniment; or pericarditis with effusion, as in case No. 9, may be the forerunner of left-sided pleurisy. Instances of double pleurisy do sometimes present themselves, when they are of the secondary form and the consequents of adynamic, malignant, or exanthematous fevers. When such examples are met with, there is a debased condition of the circulatory fluids, the exudative product is aplastic, and unlike those exudates which characterise the fibrogenic materials which in the sthenic types prevail.

It is not an uncommon thing for the presence of fluid in the pleural sac to be overlooked or unsuspected, and more especially in latent examples of pleurisy. In all instances in which there is an account of foregoing acute thoracic disease, with embarrassment of respiration on increased exertion remaining, or a feeling of uncomfortableness on lying on one particular side, the chest to the base should be thoroughly examined. For the want of such caution, I have known the complaint to have been quite passed over, and grave consequences ensue. When the presence of fluid is not detected, but long remains, the chances of cure become far less speedy and much more uncertain. The mechanical disturbance which a large quantity of liquid in the chest confers to the heart and lungs, is one of the most prominent of the symptoms. In no less than fifteen out of the eighteen cases now given, dyspnoea in greater or less degree was proclaimed. In some cases, a very small amount of effusion—even a very few ounces—will cause oppression, and, as the fluid increases, the breathing will become easier. In these exceptional examples, it would seem that the exudation, at the first, acts as an irritant, and that, in the course of time, the cavity becomes tolerant of its presence. We also know that sometimes hydrothorax supervenes with great rapidity, without being accompanied with any notable amount of acceleration of breathing. The inability to lie on either side is a symptom, as remarked, which never should be disregarded. In several of the above examples, the patients at once spoke of this fact; and, by lying in a particular posture, the uneasiness and sense of weight and oppression can be well understood. When the breathing is mainly carried on by one lung, and to recline on the sound side and thus diminish the costal mobility, and for the incarcerated fluid to also gravitate from above downwards and thus still further to press upon the organ, the respiration must necessarily become greatly interfered with. Notwithstanding that dyspnoea, as now insisted upon, is a common and a cardinal symptom, yet it must be held in mind that a large quantity of fluid may, in some exceptions, be collected in the pleural sac without such symptoms being at all marked, and almost without any degree of inconvenience being produced. The absence, therefore, of oppression is not so far to be depended upon as to put us at ease, under the notion that no effusion exists. The physical examination of the chest should not be deferred.

INSPECTION.—The first means to be had recourse to in order to ascertain the presence or otherwise of thoracic effusion is *inspection*. When the condition now considered obtains, careful observation notices less mobility in the affected side. There is generally, at the lower third, a greater or less degree of bulging, and the surface looks smooth and rounded. The intercostal spaces are less defined, and the intercostal muscles are often absolutely motionless. When the liquid has for a long time been effused, the intercostal muscles, from having been continuously stretched, lose their contractile power, become para-

lysed, flat, and then even tend to protrude. Albertini supposed, and Stokes believed, that such state denoted pus. A decomposing and debased fluid in contact with the wall of the chest, it has been thought, is sufficient to produce such flabby and flattened condition of these muscles. When the effusion is considerable, there is, as the result of left pleurisy, visible displacement of the heart; the apex-beat may be seen far away from its normal position, at or beyond the right edge of the sternum, or below the ensiform cartilage in the epigastric region. I saw one marked example of such dislocation of the heart, where the apex-beat was near the right nipple. Murchison says there is greater danger of fatal syncope when the effusion is in the left side. My own experience is certainly that there is more frequently irregular and feeble heart's action in left-sided effusion. Increase of motion in the sound side is often apparent. The patient, when asked, will tell you he feels the air go down deeper into the one side of his chest than the other. The side of effusion not only looks larger, but mensuration proves it to be larger. Fourteen out of the eighteen cases measured more on the diseased than the sound side. The increase, according to my own observations, seldom exceeds an inch; sometimes, when the cavity is almost filled, the excess will be an inch and a half. On the contrary, I have known a considerable amount of fluid collected when the measurement of the diseased side has been the same as the other. Much depends upon the yieldingness of the thoracic wall. In thin and debilitated people, the parietes are more prone to expand; and in those whose muscular systems are well developed, there is a less extensile tendency. In children, it should always be held in view that there is a ready and early expansion of the chest-wall; in them, the white and elastic tissues are more developed, the cavity more easily distends, and there is less liability to visceral dislocation.

EMPHYEMA.—In cases of empyema of long standing, inspection beholds a different condition of configuration and anatomical change. The most obvious of those alterations which have been effected is the greater or less degree of approximation of the costal edges. The intercostal and pectoral muscles become wasted; false membranes bind down the lung, and prevent its filling the cavity; and thus there is less resistance to the pressure of the external air, and hence the side becomes flattened and smaller. But this flattening and approximation of the ribs, and pressing inwards of the chest-wall, is in most cases conservative. Partial expansion of the lung and partial contraction of the thorax not unfrequently result in the obliteration of a vacuum and a secreting surface, and constitute the main means whereby nature will effect a cure. When this falling-in of the chest-wall is considerable, the spine is apt to curve towards the affected side. I have known marked deformity thus produced, and long continue, when there has been a fistulous opening; but when the orifice closed, the inclination of the spine quite disappeared. I can well call to mind one case, that of a gentleman whose trunk,

for three or four years, depended towards the side of his complaint, but who ultimately became erect. Laennec gives so characteristic a description of this change, that it may here be fitly quoted. "The subjects," he says, "have the appearance of being bent upon the affected side, even when they try to keep themselves erect. The affected side of the chest is evidently narrower; on measuring it with a cord, a difference of more than an inch is often found between it and the sound side. Its breadth is also diminished; the ribs are in closer than normal proximity to each other; the muscles, particularly the pectoralis major, are only one-half the size of those of the opposite side. The difference between the two sides is so striking, that, at a first glance, one would suppose that it is much greater than it is found to be on measuring. The vertebral column generally retains its straightness; but sometimes, however, it deviates a little, in consequence of the patient always leaning towards the affected side. This habit imparts to the mode of walking a peculiarity somewhat similar to limping."

There is another reason why the sound side not only looks, but becomes actually, larger than its normal condition. When the breathing has to be mainly carried on by one lung, the efforts of a needed compensation gradually enlarge the pulmonary tissue. The minute bronchial ramifications and the air-cells become dilated, and the puerility of the breath-sound gives confirmation to this fact. The chest-wall by degrees accommodates itself to the pulmonary enlargement consequent upon a demanded excess of the respiratory function. I lately, in the instance of a person between thirty and forty years of age, who for many years had had a fistula consequent on empyema, and whose right thorax was much contracted, saw a marked illustration of this unsymmetrical alteration effected by the compensating power of the sound lung. His left thorax had become large and rounded; and at all points it was hyperresonant. Another instance of this peculiarity came before me. A man presented himself at the hospital whose left chest bore the traces of a fistula, which, it was reported, had for a very long time been open, and which for many years had been closed. The ribs were in absolute approximation; and thus half of the chest was so small and flattened, that it looked as if it had been crushed in. Scarcely any respiratory murmur could be heard, and that which could be heard was merely a little tubular breathing at the interscapular region. The right side was unsymmetrically large. His health was good, and for years he had pursued an outdoor occupation with little or no inconvenience from his ancient malady. This person, who was a labouring man, and who had necessarily been exposed to great excesses of temperature, had lived long and procured his livelihood by hard work, and looked fairly well. In fact, it might have been said of him, in more than the significative language which is often employed, that he lived by one lung.

PALPATION.—In making our investigations in this complaint, *palpation* confers no little certitude in addition to the other physical signs. If the flat hand be placed first on the side of effusion, and then on the sound side, the absence of vocal fremitus in the one, and the distinct voice-thrill imparted in the other, supply facts of great significance. The rounded, smooth, even feel, adds testimony to those impressions made by inspection. The flat hand, glided first over one thorax, then over the other, *feels* the difference. If the palmar surface of the index finger be applied horizontally, so as to coincide with an intercostal space, and repeated pressure be made, the sensation given to the finger will be that of pressing upon fluid. In thin and attenuated subjects, this means of diagnosis is of much value, more especially in children, whose chest-walls readily give way, and in cases of some standing, and where there is a large quantity of fluid. There are other instances in which the sense of touch supplies a knowledge of the condition of things within. When absorption is taking place, and the effusion has become considerably diminished, and roughened surfaces, the results of fibrinous deposition on the pulmonary and costal pleuræ, are brought into contact, a distinct thrill can often be perceived. This was eminently so in case No. 11. This sensation augurs well of recovery. Again, this thrill, but in less degree, can sometimes be felt when the opposing serous surfaces are at the first rendered tumid, and lymphic deposition is commencing. It soon, however, passes off, because increase of serous secretion interposes between two surfaces which normally glide with smoothness over each other, and ere long keeps them apart. If the palmar aspect of both hands be placed simultaneously on each chest-wall, and full inspiration be made, the difference of mobility will be very perceptible. In certain of the foregoing cases, such inequality of expansion was readily felt. In case No. 16, ascites and some anasarca were associated with the other conditions. Dr. Handfield Jones gives an instance of this dropsical complication in a young man aged nineteen, who had left pleuritic effusion and ascites at the same time, and from whose chest eighty ounces of fluid were withdrawn, and who made a full recovery. I published, some time ago, the case of a child eleven years of age, who had thoracic effusion with considerable anasarca, and whose parents would not consent to tapping, but who fully recovered under the means taken to promote absorption.

PERCUSSION.—On none of the physical signs can more reliance be placed than on *percussion*. The evidence which it bears of fluid is striking and distinctive. That dullness which tells of fluid is quite characteristic, and unlike the dullness elicited in lung-consolidation. It is more profound and absolute than in condensation. Its lines, when the chest is not full, are narrowly and nicely demarcated. At an earlier date of effusion, the movement of the trunk, as the rule, varies the dull line. In examples of long standing, this variableness may not obtain. When the liquid is not localised by adhesions and false membranes, and more especially at an early date of the disease,

the dull line ascends to variable heights—that is, according to the quantity of effusion. I have known the dullness to reach as high as the clavicle, and up to the supraspinal fossa behind. When the fluid has thus largely accumulated, the sac is pressed laterally, and visceral dislocation in a marked manner supervenes. Sometimes the secretion is contained in septa; then the dull lines do not vary on trunk-movement; succussion gives no splash; nor is the dullness continuous from below upwards. In a case of long-standing empyema, which some time ago was under my care, there was dullness immediately below the clavicle, and some resonance below the dullness, and dullness at the base. And the full recovery of this case showed it did not proceed from tuberculosis; and the subclavicular dullness was altogether too absolute and characteristic for it to be attributed to solidification. When the effusion is in the left side, and in great amount, the diaphragm may be so pushed downward as to have its convexity below, and the spleen may be felt at the costal edge, or depending under the thoracic border. It is well to bear this in mind, or dullness so low might be regarded as produced by splenic enlargement. In left-sided effusion, the cardiac lines of dullness may be substernal, or distinctly traceable quite beyond the right sternal edge. Sometimes the cardiac dullness can be followed into the epigastrium. In case No. 11, the cardiac dullness was absent. It was evident that the organ was thrust inwards and backwards. When the right pleural sac is the seat of disease, the hepatic dull line is carried low down into the hypochondrium, and the epigastric and colonic resonances may become considerably lower in the abdomen than normal.

Encephaloid tumour and large hydatid cyst in the liver may give marked dullness; but then the clinical history, and certain negative and positive facts, will be our guide. On referring to my note-book, I find the ample report of the case of a gentleman who for some time was under my care. He had very distinct dullness of the lower third of the left thorax, which was most proclaimed at the back. He had cough, could not lie on the right side, and only slight and distant tubular breathing could be heard over the dull region. Succussion gave no splash, nor did movement of the trunk vary the line of dullness. Remedies gave no relief. The respiration became affected, and the heart's action was much increased on exertion. He consulted three London physicians, but none could speak with certainty as to the ailment. In the course of time, the disease proved to be encephaloid cancer of the lung. Such instances, however, are most rare, and, as the rule, need not be regarded as a source of fallacy in diagnosis. I have observed that in children there is, as the rule, less visceral dislocation than in adults. The diaphragm is not so often driven downwards, nor is the heart thrust away so frequently from its position. Their yielding chest-walls expand, and percussion discovers but occasionally that the heart or liver is displaced. When recovery from absorption takes place,

the percussion-dulness of the hepatic edge and the resonant sound of the stomach ascend to a higher level. If the heart have been pushed from its place, the pleximeter indicates its gradual recession; and the same fact obtains when the spleen has descended. When paracentesis has been employed, it is curious to observe how soon dislocated viscera right themselves. I have known the heart, on some occasions, fall back to its position before the whole of the fluid had been withdrawn; and the same occurred when the spleen had been forced from its site. Dulness may, and often does, remain in the thorax long after either absorption or the withdrawal of the fluid. Fibrogenic deposits may be thrown out in considerable quantity, false membranes be formed, and adhesion of the pulmonary surface to the costal pleura may eventuate, and thus a certain amount of dulness, though not of that absolute character produced by fluid, will afterwards be permanently discoverable. When such is the case, its presence is not of significance.

DULNESS.—That this physical sign was the constant accompaniment of the examples which had been given to the reader, is clearly seen. In No. 1, there was marked dulness up to the angle of the scapula, and the line of dulness varied on the movement of the trunk. I examined this lady after her recovery, and resonance was quite restored. In No. 2, there was dulness at the lower two-thirds. In No. 3, there was that absolute dulness denoting fluid. No. 4 had great dulness over the lower two-thirds of the left back. No. 5 had three-fourths of the left chest dull, and when he was discharged the dulness had disappeared. No. 6 had unusual dulness over the left thorax. In No. 7 this sign was most marked; and, in No. 8, the same condition obtained. No. 9 had much dulness. In No. 10, the same sign was distinct. In No. 11, the dulness was absolute. In No. 12, the dulness at the right back ascended to the scapular angle. In No. 13, percussion gave that absolute dead sound which is alone elicited when there is fluid. In No. 14, the dulness was evident up to the spine of the scapula. In No. 15, the dulness was discovered at the left inferior back. In No. 16, the utter loss of resonance over the region of the effusion was a cardinal sign. In Nos. 17 and 18, the dull, dead sound, given by percussion, left no sort of doubt as to the existence of fluid. It is thus seen, that the condition in question is never absent in effusions; in fact, it is one of the most commonplace laws in physics, that liquid thus placed, should not, when percussion is made over its site, emit sound. It is, as I have said, the most reliable of all the physical signs.

AUSCULTATION.—The next most potent means whereby we ascertain the presence of effusion is *auscultation*. In all the previously given cases, it has been shown how the stethoscopic signs bore out the inferences to be deduced by the other modes of diagnosis. In each instance, bronchial breathing, and bronchophony at the spinal hollow; and faintness, or most generally abolition, of the respiratory murmur over the dull regions, were the significant facts elicited. In

some of the examples, there was scarcely any tubular blowing at all; in fact, the displacement of the lung into the spinal fossa, and the great pressure exerted by the fluids, doubtless, so compressed not only the pulmonary tissues, but the bronchial tubes, as to exclude the air. Some time ago, a young woman was admitted into the hospital, whose left chest was dull to an extreme degree at every point, nor could the least breath-sound be heard at any part. Paracentesis was decided upon. She died, however, suddenly, in the night previous to the day on which the operation was to have been performed. Inspection showed that no air whatever had entered the lung. It was carnified, bound close down to the spine, and thus its functions became absolutely and entirely abolished. In the earlier stages of effusion, I have always first noticed tubular breathing, and bronchophonic cough and voice-sounds. These vary in the degree of their intensity according to the amount and continuance of effusion. In the more advanced conditions, and in exceptional cases, amphoric respiration, gurgling and cavernous voice, are well recognised when pulmonary excavations might be thought of; but concomitant symptoms will be our guide. Béhier is of opinion that amphoric breathing is only heard when the indurated lung is compressed against the larger bronchial tubes. It would be well to bear in mind that, in some cases, mucus in the large tubes will produce gurgling. It is said by Trousseau, that amphoric sounds may be produced when the effusion is inconsiderable; and it may also be said that the pathological states which give rise to amphoric sounds are by no means uniform. In effusion, there is no crepitant rhonchus; and the blowing respiration is of the diffused quality, deep, and best heard at the spinal hollow, and sometimes alone heard at the last named place. When recovery is going on, and the lung is expanding, the tubular breathing becomes less pronounced, and coarse crepitation is heard at points where before there had been only silence. In the sound side, the stethoscope recognises very customary and characteristic changes. The breath-sound becomes loud and puerile, because increase of function is thrown upon the lung which can perform its office. Sometimes the respiratory murmur becomes so intensified, that it can be heard on the effusion side of the spine. In chronic cases of empyema, it is well not to lose sight of what may thus occur. In most of the chronic cases puerility is strikingly proclaimed. In long standing empyema, the sound lung gradually relinquishes its right to that expression—it becomes hypertrophous and emphysematous. Excess of action is followed by excess of volume; just as mitral obstruction gives rise to ventricular enlargement, or as the liver grows large in tropical climates. On *post mortem* inspection after protracted empyema, I have seen the compensating lung so large, that it seemed to be too big for its proper cavity. Walshe remarks that a lung in this state, instead of receding when the chest is opened after death, may actually protrude through the opening.

In Nos. 1, 2, 3, 4, and 5, the main points elicited by the stethoscope were, the abolition of the respiratory murmur, and the presence of bronchophonic voice over the dull area. As recovery gradually ensued, coarse crepitation became audible at points where previously no air entered, and by degrees the normal vesicular murmur became re-established over the greater part of the space before occupied by the effusion. In No. 6, the breath-sound was abolished generally throughout the left thorax. Even at the subclavicular space, it could not be recognised; and, above the clavicle, only an indistinct tubular blowing could be heard. In the right chest, supplementary sounds were at once audible; everywhere over that side there was puerility. The inference could only be, that the cavity of the affected side contained a large quantity of fluid; and this opinion I had, on my first examination of this patient, expressed with much certainty; nor did the fruitless attempts which were made, by the introduction of the catheter, to draw it off, influence this conviction. As before related, inspection proved the existence of nearly two quarts of straw-coloured liquid; and this too was present, not with a lung collapsed and driven upwards and backwards into the spinal hollow, but with a lung consolidated and adherent to the chest-wall. Under such circumstances, fluid of that quantity could not do otherwise than fill the chest. When the pulmonary tissue becomes so compressed as to resemble a mere membrane, there is then far greater capacity for effusion than in instances like that of this patient, in which there was such an abundance of tuberculisation. The tubercular deposit, and the adventitious products thrown out by a low form of inflammation, solidified, and in a great extent maintained the configuration and volume of the organ, and thus prevented that compression which is so notable in empyema. In cases No. 7 and No. 14, it is extremely probable that much the same condition of things obtained as in No. 6. In case No. 9, the air did not descend into more than the lower third of the left chest; and, externally, the auscultatory examination traced abolished breath-sounds up to, and until confounded with, the increased extent of cardiac dulness. In the young gentleman No. 10, only tubular breathing was heard at the lower half; and, as he progressed towards recovery, it was matter of much diagnostic and pathological interest to watch the steady increase of coarse crepitation, and afterwards of vesicular breathing, almost to the base. In No. 11, the stethoscopic signs were in close accord with the facts elicited by palpation and percussion. Tubular breathing, without admixture of vesicular sound, added to the testimony of many other facts which told the tale of long-standing lesion with abundant effusion. In nice correlation with the improvement of the stethoscopic signs, there was less dyspnœa, less feeling of fatigue, fewer tendencies to fainting, and greater ability to ascend steps and lie on either side. In case No. 12—the pale young woman admitted into the Hospital—as the absorption went on, the auscultatory sounds improved. In the woman

No. 13, with regard to the stethoscopic indications, the same remark might be applied. In the man No. 14, auscultation gave evidence of much interest. By two operations, no less than 153 ounces of fluid were withdrawn; and, as reported, on each occasion much comfort followed the evacuation. Not only did the vesicular murmur return over a considerable space at the affected side, but the moist crepitations at the right apex at length almost disappeared. The relief afforded by paracentesis seemed to have a curative tendency at the top of the other lung, which, when I first saw him, was not only dull, but had evidently begun to break up. The practical conclusion, then, deducible, is that, in effusions which we know to be of tubercular origin, paracentesis becomes warrantable merely with a view to the mitigation of existent symptoms. In the young gentleman No. 16, there were all the stethoscopic signs above in repetition noticed as so indicative of effusion. Dr. Day, Mr. Bishop, and myself, at our examinations after the two operations, were much interested at the descent of respiratory sound as the more general symptoms of amendment became manifest. When he had made what might be regarded a full recovery, and when I examined him six months after the operation, only a patch of coarse crepitation, and at the very base, existed; and this, doubtless, was soon to be succeeded by the normal vesicular sounds. This patient, at this date, is without a trace of his malady. In No. 17, in the instance of empyema in the little boy, the auscultatory sounds were quite in accordance with the other conditions of long-standing compression of the pulmonary tissue. He made a full recovery. In the last named example, absorption was followed by the proper puerile respiration, and the patient got quite well.

It is always important in these cases to carefully note the cardiac sounds; and, in those instances in which thoracentesis is contemplated, it is absolutely imperative, as the trocar can never safely be introduced without a knowledge of the exact position of the heart. In eight of the above recorded examples, this organ was pushed under or more or less beyond the right edge of the sternum. In No. 6, the cardiac sounds were heard in greatest intensity at the right sternal edge; here there was no risk of entering the pericardium when the left thorax was pierced. In No. 7, the apex-beat was felt, and the sounds were best heard beyond the right sternal border. In No. 11, the cardiac sounds were but faintly heard; and I concurred with Dr. Fuller and Mr. Rix that, in such a case, the greatest caution was needed in the introduction of the trocar. The side of effusion was most carefully auscultated, lest the pericardium should be wounded. In case No. 14, the heart could be felt and most distinctly heard beneath the right nipple. In No. 16, the cardiac sounds were intensified towards the right. Displacement of the heart, and the twisting of the aorta and large vessels, may give rise to morbid sounds, which cease to be heard when, by absorption or operation, the fluid has been removed and the organ has resumed its normal position. When orthopnoea is added to other of the graver symptoms,

the heart-sounds are generally pronounced feebly, consequent upon the mechanical pressure exerted upon this organ or the great vessels. Auscultation in such cases gives information of the greatest consequence. The removal of the apex-beat and the greatest intensity of the sounds are by far most marked in left-sided effusion. In antero-posterior expansion, the cardiac sounds become feeble or lost. The auscultatory signs, not only of the lungs, but of the heart, are necessarily varied by a variety of phenomena. Pericardial effusion may be coexistent with pleural effusion, as in case No. 9. Cohesions, empyema, costal approximation, long duration of the disease, and other circumstances, must very naturally modify cardiac action. In some cases of left pleurisy, the cardiac sounds are best heard to the left of the nipple, and, in exceptional instances, even below the axilla.

In some cases a considerable amount of fluid may be contained in the pleural sac; and for some time this may remain, without giving rise to any marked symptoms, or to any great inconvenience to the patient. A person under such circumstances may look tolerably well, have a fair appetite, and even pursue his occupation; nor may there be much fever, pain, or local distress. Bronchitis, pneumonia, and phthisis present objective symptoms which at once lead us to suspect the true nature of the malady; but it is not so in certain low and masked forms of pleuritic effusion. In the last named affection, a strict attention to the physical signs is of the greatest importance; and it has repeatedly come to my observation that a neglect of the physical signs has led to the gravest mistakes. A patient will present himself under the idea that his case is by no means serious. He does not suffer, and has not suffered much. The absence of acute pain, and not having experienced any marked attack of illness, favours the supposition that his complaint is not of great consequence; and it has most probably been referred to cold or some undefined temporary loss of health. He tells you, however, of his having for some time had a cough; that his breathing becomes accelerated on increased exertion, and that he cannot lie on either side; and, on being interrogated, he admits the loss of flesh and strength. The facial indication confirms our suspicion. If, in addition, there be languor of the circulation, as evinced by cold extremities and an irregular pulse, and a tendency to syncope, very conclusive evidence is then presented. Effusion into the pleural cavity cannot, however, remain there for an indefinite period harmlessly. Its mechanical disturbance, and the other derangements to which it gives rise, fail not sooner or later to become manifest. Hasse says sometimes the effusion may prove perilous or fatal through its character or amount, without the appearance of such symptoms as to excite alarm. Amongst the other morbid conditions produced, a febrile temperature is generated; the digestive organs become impaired, and a diminished vitalism is the consequence. Claude Bernard has shown that, when digestion is not normally carried on, the gastric secretions do not retain their physiological

properties, and are unequal to those functions in vital chemistry which are so necessary to the process of chymification; hence we see one cause why it is that fever in pleuritic effusion becomes of the hectic character, and is followed by exhaustion. In chronic cases, flatulent dyspepsia is most common, and the patient is usually troubled with acid eructations. In empyema, I have generally noticed these conditions as permanent symptoms.

It is a fact of practical importance, and one which should always be borne in mind, that thoracic effusion is sometimes thrown out with great rapidity, and even a few hours will be long enough for a large amount of liquid to collect. Its sudden presence in the sac generally produces much systemic disturbance; but, as the mediastinum and the diaphragm give way, and as the intercostals become stretched, the feelings of dyspnoea and distress become mitigated; the organism is rendered more tolerant of, and accommodates itself to, the extraneous product. I have been astonished at the celerity with which these collections form in children, which peculiarity may, perhaps, be accounted for by the quicker circulation and the greater exudative tendency which there is in children than in adults. In all the acute affections of childhood, if there be any dyspnoea or signs of pulmonary disturbance, physical examination of the chest should never be omitted. When effusion occurs in children, it is nearly always as the complication or sequel of some other form of disease. Bronchitis, pneumonia, or pleuropneumonia, are the frequent associations or forerunners of this condition. It forms the not uncommon sequel in eruptive fevers, when the liquid is nearly always sero-purulent or purulent. The younger the child, the less chance is there of recovery in this affection. In the acute empyema of children, pus may be secreted from the outset of the inflammatory symptoms. In children, the effusive tendency is more prone to extend to the pericardium than in the adult; and a fatal termination in these little patients sometimes comes on in a sudden and unexpected manner.

PATHOLOGY.—The earliest pathological changes which take place in the pleural membrane are not in the epithelial covering, but in the minute vessels which permeate the subpleural cellular tissue. Slight ecchymoses are then detected over the hypervascular patches; and these generally make their first appearance over the costal lining. Such ecchymoses are of a pale red hue, as if from imbibition; and, in the course of time, these spread and seem more uniform. The hyperæmia thus caused may be seen by the naked eye; and the microscope reveals the capillaries as being gorged and dilated. With the process of such pathogenic alterations, the clear serous membrane loses its polish, looks clouded and tumid; and, according to Rindfleisch, the epithelium has then been detached, and the emigration of colourless blood-corpuscles has already begun. Proliferated epithelial cells and exuded blood-cells constitute the cellular element of the fluid. Various amounts of a red-dish yellow elastic

substance lies loosely on the serous surface, constituting the rudiments of adventitious formations; and in the free fluid exuded are suspended depositions of fibrinous lymph in the form of ragged flakes; and, if we take some of the matter and examine it under a high power, we find large masses of cells and nuclei, together with a lax web of slender fibres, which prove, on chemical examination, to consist of a coagulated albuminous substance (Kindfleisch and Münck). The relative proportions of serosity and fibrinous matter are very varied; and the etiological conditions determining such proportions are manifold, such as those which may be regarded as diathetic, dyscrasial, the sthenic or asthenic types, the duration of the disease, the age of the patient, and like causes. When the fibrinous element predominates, and the inflammatory phenomena are localised, the plastic materials soon become organised, and adhesion results. In some cases, the gelatinous substance effused is so susceptible of organisation, that blood-vessels form in it with surprising rapidity; and, according to Andral, even less than twenty-four hours will suffice for arborescent reddish lines to become developed.

In chronic pneumonia and in phthisis, these limited and plastic effusions are most common. According to Hasse, much depends upon the condition of the adventitious membrane which is thrown out upon the pleural surfaces, as regards the degree of absorption which the system is able to effect. Again: this effusion may not be so germane to the organism as to favour the assimilation of the formative constituents; and ingredients engendered by an altered vitalism, some blood-changes, an abnormal blending of proportions, or premature consolidation, may oppose the absorbent functions. The adventitious membranes, and more especially in sthenic types of inflammation, are formed with much rapidity. I have seen them of yellowish-white, and somewhat resembling the white of egg. Their free surface is of villous character, and their degree of tenacity is much determined by the duration of the disease. When the plastic materials are very abundant, they are soft, opaque, and yellowish-looking, lie loosely agglutinated to the serous surfaces, and irregular shapeless masses gravitate to the lower parts of the cavity. On closer inspection, they generally consist of roughened flocculent layers, or are honeycombed or spongy. The liquid by which they are accompanied contains floating flocculi, long shreds, or is grumous, and contains varying amounts of the colouring matter of the blood, which gives it a mahogany or dirty reddish appearance. The best examples of the kind of effusion now particularly described are in primary, and eminently in traumatic, pleurisies, and when speedy and flagrant inflammation has set in. When such large amounts of formative substance are thrown out, and assimilation to the serous membrane cannot be effected, the tendency to organization is very manifest; and thus substances which, if left, would acquire something of the inconvenience of foreign bodies, now take on those

vital and accommodative properties which confer a tendency to the organism.

From personal observation, I have been long convinced that large areas of the costal and pulmonary pleuræ may become adherent with little or no detriment to the general health, and that greater or less extents of binding down of the lung to the chest-wall are much more common than is generally supposed. I have been much surprised at the very frequent fact of pulmonary adhesion, and in persons who had never, on interrogation, referred to any severe chest-attacks. The respiratory function seems to accommodate itself to the lessened mobility of the lung and thoracic wall, and at length no real disturbance subsists. In pulmonary phthisis, when superficial vomicæ irritate the serous investment and give rise to a circumscribed fibrinous deposit, adhesion may be looked upon as of conservative tendency, and protective from worse events, precisely as in hepatic abscess and in chronic ulceration of the bowels, as I have, when discussing the subject, more fully commented upon in the article on Peritonitis. The plastic exudate may be a wide-spread lamella investing the greater part or the whole of the pleura, and of varying thickness. It may be uniform where clothing the serous surface, interrupted or eribriform, and I have seen, where the membrane was thinnest, the pulmonary substance bulge through of bluish-red colour, in the form of bossy protrusions or mammillary appendages.

There is another pathological change which is of great significance in pleuritic effusion, but which has not been so prominently considered as the fact demands, and that is, the formation of coagula in the pulmonary artery. It is a morbid change which greatly tends to the carnification of the pulmonary substance, and also, by clots finding their way into the cardiac cavities, is sometimes followed by sudden death. M. Blache, in a case of sudden death after effusion, found a clot in the right ventricle of the heart, which, he believed, had been formed in the pulmonary artery of the affected lung. M. Marrotte has also regarded the formation of clots in the pulmonary artery as the cause of sudden death in pleuritic effusion. Renalt also found clots in the right auricle, ventricle, and pulmonary artery. According to MM. Vallin and Potain, and also Robinson, this complaint may give rise to embolism in the cerebral arteries, and be followed by paralysis and death. The blood-stasis in the pulmonary circulation caused by lymphic obstruction is doubtless one cause of that *albuminous expectoration after thoracentesis* respecting which French pathologists have latterly written and said much, and to which I shall hereafter more fully refer.

In those forms of pleurisy which have been variously named secondary, latent, asthenic, subacute, and consecutive, and in which also may be included those which at the outset exhibited the more primary types, but which passed into chronicity, a series of morbid phenomena are observed, which prove a lowered vitality in the

effused products, and a lessened capability of organisation. The formative materials are given off in more diffused manner, and the sero-albuminous exudation is prone to assume the puriform state. The common accompaniments are an obvious cachexia, degradation of the circulatory fluids, and a general loss of resistance in the organism. In such cases, the solid matter is thrown out in a disintegrated state, insusceptible of organisation, and is diffused through the fluid in shreddy flakes and detached particles. Alterations in the fluid, by many circumstances, become varied, marked, and absolute. As I have already said, it may at the first be mere serosity, and, in a greater or less duration of time, pus-globules and the colouring matter of the blood may in different quantities be admixed. The outcome of a serous membrane, in thus having its products changed, resembles that which is noticed in cutaneous and mucous membranes, as in phlegmonous inflammation and bronchial catarrh. In such affections, mere serosity is the first out-pour; then pus appears on the surface of the one and in the expectoration of the other. But, in some cases of pleurisy, the morbid secretion is doubtless purulent from the first, and most especially when this complaint is the accompaniment of exanthematic and adynamic types of fever, in erysipelas, and in blood-poisoning. I believe, in scarlet fever, pleuritic effusion is always purulent from the beginning. A suppurative condition may exist in the system, just as we know such to be the case in some puerperal women and in small-pox. This diathesis in puerperal cases is very generally fatal; and, in variola, any inflammatory sequel is pretty sure to be followed by the formation of pus. Scarletinal arthritis, as it is well known, sometimes destroys the patient by purulent formations; and, when a low form of pleurisy comes on as the sequel of that disease, a fatal termination often results. Some writers have said that the effusion into the pleural sac, when preceded by inflammation, and not hydrothorax, is never wholly serous or wholly purulent. If such be not absolutely the fact, it is unquestionably true that pus and serum are generally found together, though in most varied proportions.

The pyogenic conditions which inspection reveals in the low and chronic forms of the disease now considered differ greatly, both as to the relative proportions of the liquid and solid materials, and as to their elementary characteristics. In some cases there may be a great extent of false membranes, and thick shapeless agglutinating deposits, which, on close examination, are seen to be made up of lamellæ, or of the obvious deposits of recrudescence; and these are found in association with a turbid fluid that contains an abundance of floating flocculi, loose shreds which are manifestly inorganisable, and other aplastic products; and, in examples of long standing, the lung may be so compressed and bound down as to render its expansion most difficult or impossible. Again, it may be that the adventitious formations have at certain places become cartilaginous or ossific. Sometimes the lung becomes encased in a thick resisting

false membrane; and then the last event which can occur is union with the costal pleura, and thus the obliteration of a cavity which had taken on a persistent secretory function. Relatively as the plastic masses become vascular, does the fluid diminish; and the converse also holds good; for when the organisation is arrested and imperfect, and the vital energy of the product limited to coagulation, the fluid effusion is more abundant and longer withheld from absorption.

The secretion of pus in the pleura, or *empyema*, as it is more commonly termed, is rarely primary, except in extremely high inflammation, as the result of injury, and as occurring in children. I have already observed that, in the exanthems and in adynamic types of fever, in pyæmic poisoning, and, it may be added, in chronic phthisis, it not unfrequently occurs. The secretion of pus from the outset indicates pulmonary tuberculation. There is no doubt that the pleural membrane is most liable to secrete pus, and in most marked manner, when there is pneumothorax; and we know this to be the rule of morbid sequence when a tubercular abscess has at the surface burst and let in air, or when the air from any cause has been more immediately admitted through the thoracic wall. Sometimes pure liquid pus alone forms; but there is also most generally a resistless false membrane, which is loosely adherent to the serous surfaces. Sometimes stratified layers of plastic depositions are discovered in association with the purulent fluid; but in such cases the empyema has been of long standing. Whatever kind of products may be poured out into the cavity, when pus is once generated, they become stamped with the puriform characteristics; and there is then doubtless also a tendency for organisable materials to resolve themselves into pus. Pus has been termed a fluid tissue; and the suppurative process is a continuation of the first inflammatory phenomena, caused by an excessive efflux of nutritive materials. Exuberant growth and reproduction are its distinguishing properties; it is the notable result in septicæmia; and, as before remarked, there is an etiological element in personal predisposition. Its typical condition is that of abscess; but its effusion into a serous sac is to be regarded histologically analogous. One of the most notable peculiarities of purulent secretion, either in the chest or abdomen, is the enormous quantity which in these serous sacs may be secreted. A short time is sufficient for even quarts to be thrown out. In some patients with empyema, we are surprised at the vast amounts which for weeks and months are daily given off. Trousseau cites the case of a small child which in two hundred days secreted forty quarts of pus. We know, however, how rapidly, and in what quantity, pus will be formed in a few square inches in ulcerations of the cutaneous surface; and it can thus be better understood how such immense amounts can be produced when a serous surface extending to square feet assumes the secretory function. The system becomes much impaired by such a vast

drainage; but it is marvellous how it accommodates itself to the outpour, and how long it can be kept up without the indication of a fatal declension of vital power. The best histological authorities say that vast numbers of leucocytes first migrate from distended blood-vessels into the connective tissue, and there become proliferated; and then their motive tendency is upwards and outwards. A membrane surcharged with liquor sanguinis, the consequence of vascular repletion, becomes the seat of multitudes of corpuscular elements; and, when the secretion escapes on the free surface, it is crowded with pus-corpuscles.

In some instances the effusion consists almost entirely of *blood*. In the young gentleman, case No. 16, at the second operation of paracentesis, a pint of what seemed to be pure blood came away. When such is the fact, malignant disease is often suspected; but, when the pleura is in no way involved in any carcinomatous affection, there may be sanguineous serosity; and such statement holds good, according to my own observations. Laennec and Andral long ago pointed out that an inflamed pleura may give off an effusion of blood. MM. Thiers, Tardieu, and Arran have related such examples; and MM. Guillot and Leroux have recorded the history of an epidemic of measles during which several children died of hæmorrhagic pleurisy. Rokitansky says that chronic inflammation of the pleura frequently gives rise to hæmorrhagic effusion. Sanguineous coloration is not very unusual in tubercular pleurisy, and it is common in malignancy within the thorax. Hasse gives it as his opinion, that blood may transude into the cavity; and he speaks of an entire effusion consisting of pure blood, which separated into serum and crassamentum. The causes of blood being found within the chest when pleurisy exists may be from other conditions than a transudative change in the membrane. It may eventuate from the laceration of small vessels in the adventitious and pyogenic deposits after some extra exertion, or from coughing. Again, the lung, by its expansion, may tear the semi-organised structures by which it has been bound, and thus hæmorrhage would occur. Sometimes the introduction of the canula wounds a branch of the intercostal artery, or pierces a morbid and vascular growth, and blood becomes mixed with the other liquid contents of the chest. In such instances, coagula are formed, and these gravitate to the base.

It is still a matter of dispute as to whether *gases* can be evolved into the pleural sac when there is no solution of continuity during life. Hodgkin and Andral do not believe that gases can be in the living subject generated within a shut serous sac. Rokitansky thinks they may. When gases are discovered in this cavity, it is most probable that some overlooked but small ulcerous orifice has existed in some bronchial tube. A small opening would be sufficient to take in much atmospheric air, and thus the decomposition of incarcerated fluids would be favoured. This, however, is a question which modern pathologists have not settled.

The fluid present, as I have already observed, and more especially if in notable quantity, cannot remain long and harmlessly in the pleural cavity; indeed, the longer it there remains, the less amenable will the complaint be to treatment. The liquid itself becomes debased, and acquires deleterious qualities after its removal from the circulation, and various pathological changes of necessity eventuate. The mechanical inconveniences exerted upon vital organs ere long become marked and manifest. The dislocation of the heart, particularly in left pleurisy, and the torsion of its great vessels, and the compression of the pulmonary substance to the partial or absolute exclusion of air, produce grave effects, and tend to syncope and asphyxia. If the natural effort of absorption be protractedly carried on, the general health succumbs, as proclaimed by facial pallor and hectic, emaciation, and the declension of vital power. The binding down and condensation of the lung-tissue keep surfaces apart which normally glide with smoothness over each other, a vacuum is established, and the lining membrane which bounds the cavity takes on a persistent secerment function. If the pent-up fluid can find no ready exit, that natural law in the organism which is seen in an ordinary abscess comes into force. Pressure upwards and outwards is made when its escape is as a natural effort attempted where there is the least resistance, and thus it is that an empyema at length points in the thoracic wall, or, what still more frequently occurs, the fluid finds a passage through one or more of the bronchial tubes. Duroziez relates the sudden and spontaneous evacuation of an empyema by the bronchial tubes, in a man aged thirty-two, who recovered. This mode of its escape was well shown to me in a case. Dr. Farrington of Penshurst requested me to see with him a boy ten years of age, who had had a recent attack of pleurisy, and on whose left chest there were all the physical signs of effusion. Dr. Farrington very properly regarded the case as suited for paracentesis. On the following morning, when we met, it was reported that a pint of purulent matter had come up, suddenly, after coughing during the night. The patient coughed up more at our visit, and this was most fetid and offensive pus. By this unaided mode of exit, the drainage was continuous and complete. Dr. Farrington wrote to me afterwards, and said, "The boy has quite recovered." The pus may burrow through the diaphragm, but this mode of its evacuation is exceedingly rare. When there is pointing on the chest-wall, so far as my own experience warrants the opinion, its place of election is mostly at the fifth interspace, somewhere between the mesial line and the costal angle. It is sometimes at the base. If the morbid process be allowed to continue, and the evacuation of the fluid be not anticipated instrumentally, caries of one or more ribs is a common occurrence. The periosteum is pressed upon, becomes ulcerated, and the ossified tissue soon becomes similarly affected. Thus nature establishes a fistulous opening, if the surgeon do not interfere. I have in some other cases known an empyema empty

itself through the lungs, and full recovery succeed. It is possible that pus may be removed by absorption alone, and even when the quantity is by no means inconsiderable. As it has been suggested, the power of endosmosis and exosmosis may aid in such removal; and the experiments of the late Professor Graham may be considered to add confirmation to such belief. In chronic cases, and in empyema, when the fluid has been absorbed or taken off by the canula, and the conditions of amendment set in, there generally remains more or less of dulness at the base. Sometimes, after what is regarded as full recovery, some of such dulness continues. This is consequent upon free albuminous masses gravitating to the lower part of the chest, where, being placed in contiguity with false membranes, they become organised. And adhesion to the lower costal and diaphragmatic pleuræ, often by thick membranous folds, is another condition productive of such dulness.

There is no doubt that, in the tubercular diathesis, empyemic effusion is not unfrequently followed by pulmonary phthisis. Tubercular granules are seen not only in the pulmonary substance, when the lung is not absolutely compressed or carnified, but they form as metamorphoses in pleuritic coagula and in pseudo-membranous formations in their varied conditions of organisation. In pyopneumothorax, when the secretion is particularly prone to decomposition, and when deleterious and irritating matters are transferred into the circulation, a dyscrasia supervenes which favours any diathetic tendency to tuberculosis. I have in several instances known an empyema to be followed by phthisis. In one young gentleman, in whose case I was from time to time consulted, he got on pretty well so long as he merely had a fistulous opening with a compressed lung, but, when tubercles became deposited in the other lung, attacks of threatened asphyxia came on, hæmoptysis succeeded, and, after a copious hæmorrhage, he rapidly sank. By a parity of reasoning, it is not improbable that the hitherto sound lung should become diseased. A lung that is overworked, like any other organ which is overworked, acquires a tendency to lesion, and more especially to some of those heterologous changes which are degenerative. We know that, after middle life, excess of cardiac action is liable to produce disease in the left heart; that a liver which, by the patient's long residence in a tropical climate, has had a continuous excess of function, is apt to become hypertrophous by the inordinate growth of the areolar and filamentous tissues; and that protracted cerebral stimulation favours degenerative alteration in the basic arteries, and is followed by abnormality in the cerebral cells; hence this compensating exertion in one lung which is compelled to do the office of two, not unfrequently takes on tuberculisation. I have before remarked, that pulmonary tuberculisation is not unfrequently the forerunner of pus in the pleuritic cavity.

In a long-standing empyema we may always be suspicious of phthisis coming on to be the fatal winding up of the case. In

persons of strumous diathesis, as observed by Trousseau, latent pleurisies are themselves the expression of phthisis; and on this point he quotes from Stoll, "*Est (pleuritis latens) sæpe chronica, non raro hæreditaria, tumque in phthisin terminanda.*" If, then, as some authorities are of opinion, the absorption of pus in an empyema is liable to produce tubercles, a cogent reason is supplied, in addition to others, why a puriform collection in the chest should not be allowed there to remain. I believe that the strumous taint in children is the most fertile of all causes in the production of secondary pleurisies in these little patients. It sometimes happens in those instances, in whom there has been effusion in the pleural cavity, and when absorption has nearly or wholly removed the fluid and hopes are entertained of full recovery, that phthisis sets in. The efforts made by the system to carry off a large extraneous product, and the irritation which is thus conferred by noxious materials being taken up, make such a demand on the general powers of the organism, as to break down the health, and bring on that lowered vitalism and those malassimilative functions which are frequently followed by tubercle.

In those cases which terminate in recovery, one of the most notable, and in many instances, it may be added, one of the most desirable results, is that of *contraction*. In examples of the chronic class, when the fluid has been removed by absorption or by the canula, and when the adventitious coverings of the lung and the false membranes by which it is bound down, are such as to overcome the efforts of expansion; and, more especially, when a greater or less degree of complication of the pulmonary substance exists, a vacuum is created, and particularly when the ribs are elevated and the diaphragm is depressed. The pressure of the atmosphere on the external thoracic wall drives the ribs inward, at the same time approximating their edges. Again, the diaphragm and the intercostal muscles, by having been stretched by the presence of fluid, and, it may be, having been injuriously acted upon by the decomposing effusive products lying in contact, become paralysed, and lose much of their contractile power. Thus, another pathological cause is given to account for the driving in of the chest-wall. When this flattening has taken place, the ribs remain in the position of forcible expiration. The thorax may be thus narrowed by a couple of inches or more in the transverse or longitudinal diameter. In children, this deformity is sometimes very considerable, because the white tissues are more developed in children, and hence there is less resistance. In adults, and old people, the parietes are more rigid, and it is thus in them deformity is less common, and less easily effected; there is also a lessened chance of the pleural or costal surfaces being so brought into contact as to obliterate the vacuum and arrest the process of a secreting cavity.

When, in empyema, a large secreting surface has for long thrown out pus, and nature attempts a cure, there is an aim at cicatrisation

as there is in ordinary abscesses. The membrane contracts with concentric effort, and union would readily be accomplished if it were not for bony rigidity. Rindfleisch well describes what takes place in this complaint. "This huge cicatrix," remarks this author, "contracts like any other scar, and causes mechanical efforts of an imposing order. It is an admirable illustration of the gigantic results which nature is able to produce by the additional repetition of functional movements of the same order; and yet, the resistance to be overcome during the healing of an empyema which has opened externally, is nothing less than that of the vaulted arches of the thoracic skeleton, which have to be dragged onwards, in a direction, that is, which the whole aim of their being is to resist. There is an erroneous impression afloat, that the cicatrising process is able to help the expansion of the collapsed lung. But experience teaches us, as might have been expected *à priori*, that it is the fibroid tissue which serves permanently to compress the lung. Sooner than allow any such expansion, the remaining thoracic viscera are dragged over to occupy the space which was formerly filled by the collapsed lung. No Torricellian vacuum is produced. The stress is borne by the neighbouring organs, which are dragged out of their places. The fibroid sac, into which the pleura has been converted, must and will contract, just as an urinary bladder contracts; and this contraction occurs with such force, that not only are the soft and yielding thoracic organs compelled to follow it, but the ribs also are dragged downwards and inwards till they overlap one another like the tiles on a roof; the vertical column itself undergoing a corresponding curvature. At the same time the size of the cavity is proportionately lessened, a few drops of pus only occasionally dribbling from the fistulous orifice, and the process of repair is brought to a close by the total obliteration of the cavity."

TREATMENT.—With regard to the treatment to be observed in pleuritic effusion, it is, of course, to be presumed that the usual remedies applicable in the preceding and acute stage have already been employed. To maintain the general strength and to promote absorption are the chief objects to be held in view. It is quite evident, from the results which obtained in the majority of the above-recorded cases, that, in many instances, the absorbents will take up very large quantities of effused products into the thoracic cavity, and if a cure can be effected in that manner, such is preferable to operative measures. Sutton advocates absolute rest, and says many cases may recover by absorption. In eleven, or nearly two-thirds, of the examples before given, the powers of absorption were relied upon, and with success. In Nos. 1, 2, 3, 4, and 5, the fluid soon disappeared. In case No. 9, there was considerable effusion, not only into the left thorax, but into the pericardium, and at the end of three months no indication whatever of fluid remained. In the young gentleman No. 10, a few weeks sufficed to effect full recovery, when it was very clear that he had had liquid in his chest from the attack of acute pleuritis

which he had six months prior to my seeing him. In the patient No. 11, absorption under the treatment to which he was subjected dispersed an effusion, which, as Dr. Fuller concurred with me in believing, had been in the pleural sac for nearly three years. The dyspnœa, inability to lie on either side, and occasional feelings of suffocation, soon became mitigated after being treated according to the means reported in his case. In cases Nos. 12, 13, and 18, unequivocal evidence was, by the results, supplied of the efficacy of the remedies. All cases do not, however, respond, like those now cited, to mere medicinal measures.

Much discrimination is required in the selection of those patients in whom absorption may be trusted to, and there are certain conditions of negative and positive character which ought to be well and duly considered. If the fluid be not large in quantity; if the line of dulness do not ascend higher than one-third of the thoracic wall; if we believe the product to be serum, and if there be not quick pulse, excess of temperature, with other phenomena of symptomatic fever; if there be no marked disturbance in the respiratory functions; and if the patient appear to be a person of good and unbroken constitution,—then absorption may be decided upon, and with much probability of success. I have already impressed upon the reader the fact that in some instances even a very moderate amount of fluid will cause great irritation, as if the organism from some ill-understood condition—some idiosyncrasy—were intolerant of the presence of this product in one of its cavities though placed without the current of the circulation. Such peculiarity would constitute a cogent reason for the more speedy effect of instrumental interference. Again, when the amount is very large the effects of medical agents are not to be waited for, and thoracentesis becomes imperative. The same rule should be observed when we have good reasons for the supposition that the effusion is purulent. I feel certain, from a rather extensive experience in this affection, that, whatever medicines be prescribed or whatever general means be adopted, the patient should be kept as *quiet* as possible; in other words, the heart's action should remain subdued, because vascular excitement favours the exudative process. Moderate open air exercise, in order to maintain the general health, is to be observed, but such should always be of passive character. Quiet and warmth tell for more in this complaint than is generally suspected.

The remedy which I believe to be more efficacious than any other drug is the tincture of the perchloride of iron. I have generally ordered it in combination with quinine, or in some bitter effusion, such as of quassia or calumba, with chloric ether. In those examples in which there is marked anæmia, iron is indispensable. If the process of digestion be feeble, a few drops of the liquor strychniæ may be added to each dose. In children and those of strumous habits, the syrup of the iodide of iron and Easton's syrup, which contains

iron, phosphorus, quinine, and strychnine are given with good results. Parrish's chemical food immediately after meals is to be commended. In many, or perhaps it may be said in nearly all cases, cod-liver oil should be ordered at the same time; this, however, will depend much on the state of the tongue. In instances of long-standing effusion, I have repeatedly remarked that the patient has complained of acid eructations with continued flatulency. In such cases, lime-water, or the carbonate of potash or soda, may for a time be taken, and the liquor bismuthi et ammoniæ citratis is a good preparation. The oil should be withheld until the digestive organs become improved. When there is no renal complication, and the powers of the patient have not succumbed, the ordinary diuretics, such as the acetate of potash, with liquor scoparii, spirits of juniper, and the preparations of squills and digitalis, may be tried; and, with such of these as may be prescribed, from three to six or eight grains of the iodide of potassium should be given every six or eight hours. The diuresis may be promoted for a time, then given up, and resumed again, according to the measure of the patient's strength. The bowels should be maintained in moderate action, and from time to time small doses of blue pill may be prescribed to stimulate the liver, because, when rapid absorption is going on, that organ should efficiently discharge its functions; in fact, the great secernent organs and the emunctories should be placed under the most favourable conditions for the elimination of excessive and effete materials. It is advantageous, also, that the patient should occasionally have a warm bath, and daily ablutions with tepid water are desirable.

With regard to external applications, counter-irritants and vesicants have long been held as favourite remedies. Flying blisters have also been much used. Some writers are of opinion that the old-fashioned mode of blistering ought, in this affection, to be discouraged. My own experience is not so absolute. I think, after other remedies have been employed, and absorption has taken up the greater part of the fluid, that vesication aids in the promotion of cure; nor is it well to entirely discard a practice which has the recommendation of ancient usage, without a sufficient accumulation of facts to warrant the decision. In cases Nos. 1, 2, 3, 9, and 10, blistering was of undoubted service. In case No. 9 it was eminently efficacious. The patient, as evinced by the pulse, the respiration, and other concomitant symptoms, was evidently in extreme peril. A large blister was applied over the seat of lesion, when marked and very decided relief immediately ensued. The amendment was dated from the application of that remedy. In the generality of cases there is no agent on which I would place more implicit reliance than iodine. When Dr. Fuller met me in the instance of the gentleman No. 11, he told me of the advantageous mode of using iodine in this complaint when considerably diluted. He used it in the proportions of one of the tincture to seven of water. In such strength it does not vesicate, the cuticle

does not desquamate at all, and the cutaneous surface can take up more of the remedy. The half-waistcoat, consisting of two thicknesses of flannel backed with calico, becomes saturated with the drug, and an increase of warmth is locally maintained. I have since, in several cases, thus applied the iodine, and some of my medical friends have done so with beneficial effect. The iodine thus applied is the best mode of procedure at the outset. The ordinary iodine ointment of the *Pharmacopœia* can afterwards be substituted, and the friction may also aid in the good effects.

The diet should be light and nutritious; all such articles being carefully avoided which are calculated to disorder the digestive organs. With regard to stimulants, I believe good port wine to be the best, a pretty generous allowance of which tends to sustain the vital powers and to expedite recovery. When the stomach is weak and irritable, and the appetite capricious, some of the sparkling wines may for a while be substituted, or Bass's or Allsopp's bitter beer may be instead ordered. When this affection occurs to those whose circumstances allow of any recommendation which the physician may suggest, and when absorption has been effected, there is no doubt but a residence during the following winter in a warmer climate is to be recommended. When a lung has been long pressed upon, and its functions have for long only been partially performed; when lesion has existed in the thorax and in chronic form; and especially when there has been a greater or less degree of solidification in the pulmonary tissues, there is no doubt that the irritation thus instituted is such as to favour tuberculisation. Phthisis is the sequent to be feared. An equable and higher temperature, by determining the blood to the surface; the non-irritant properties of a milder atmosphere; the greater opportunities which the patient has of being in the open air, and thus re-invigorating the system; and the light and cheerfulness of a summer clime, are extraneous conditions which favour amendment. Pau, Algiers, Egypt, or the Riviera, are places where the patient might repair to with every hope for the re-establishment of his health.

The foregoing rules of treatment have been given for those cases in which urgent symptoms do not exist to demand a more speedy removal of the effusion, and when the slower process can safely be tried. But there are many examples of this complaint, when, from various reasons, other and more effective means cannot be delayed. I, therefore, now approach the consideration of that which is by far the most important remedial measure in pleuritic effusion—viz., *Paracentesis Thoracis*. It would be out of place here to enter into any lengthened detail of the history of this operation, as much information has been latterly given by others on this head, and *Thoracentesis* has been supported by far more advocates than it formerly attracted. In passing, it may be briefly observed, that paracentesis has been practised from very remote ages, having, like many therapeutic agents, been at times almost abandoned, and then

having been had recourse to again. We must go back to the school of Hippocrates for the chest having first been punctured; and it is strange that the great and manifest benefits which result from this, a comparatively simple operation, and really an operation attended with little or no danger, should have not been rendered more available. Hippocrates describes the symptoms which necessitate the perforation of the chest, but the father of our art had not the preciseness of diagnosis which discoveries and accumulated experience have given to the modern physician. The Hippocratic schoolmen knew not the difference between hæmorrhagic, purulent, and hydrothoracic effusions, nor yet between these and pneumohydrothorax. They relied upon succussion. The physical signs, which to us are exact exponents of the hidden state of things, were to them unknown. Galen merely followed Hippocrates. Celsus gives the operation no prominence. In fact, the Greeks, Romans, and Arabians allowed it to fall into desuetude. In the sixteenth century, that epoch renowned for the revival of science, as it is renowned for the culmination of letters, opening the chest was once more brought into notice. Fabricius advocated paracentesis, and observations made on penetrating wounds strengthened arguments in its favour. Bontius and Bartholin took up the question, and much was said relative to the introduction of air into the pleural cavity. In the seventeenth century, Gerome Goulou, Zacutus Lusitanus, Willis, and Lower mention cases of paracentesis. About this time, Drouin used a trocar, and a hundred years later, Leirde advocated the use of the same instrument. The introduction of the trocar was, however, withheld, from a false fear of penetrating the lung. It could not be decided, as we can now decide, when the lung is in juxtaposition with, or when it is pushed away from, the chest-wall.

The discovery of Laennec conferred a certitude in this as it conferred a certitude in many other points in thoracic pathology, and a sure and an enduring basis was laid for the more extended employment of thoracentesis; in fact, the stethoscope inaugurated a new era in the treatment of pleuritic effusion. At the beginning of the present century, the evacuation of liquid from the pleural cavity was rarely ever had recourse to. A few sparsely narrated cases may be found in medical literature, but the great usefulness of this expedient had no hold on the general professional mind. Not only, as I have already remarked, was there a dread of penetrating the pulmonary substance, but there was a dread of fatal syncope, and a dread of the admission of air into the sac. Hamilton Roe, in his excellent monograph, which did much good service in recalling attention to this question and to the re-establishment of the operation, remarks that Boyer, Dupuytren, Laennec, Gendrin, and Stokes were opposed to it. Such high names would doubtless weigh with many, and form no mean barrier to the progress of this potent remedial measure. To Roe, Davies, Trousseau, and Hughes, and, it may also be said, to Bowditch and Morill Wyman, is mainly due the credit

for having brought into comparatively common practice the puncturing of the chest-wall, and thus the observance of a curative means which can hardly be over-highly estimated, as it is beyond all dispute that many lives are now saved which even twenty years ago would have been sacrificed to inertness and the let-alone treatment.

Paracentesis thoracis may be contemplated in reference to two objects being attained by its use; and these are, when a curative and when a palliative result is expected. We sometimes have recourse to it when recovery seems out of the question, and when there are such complications as to indicate an approaching fatality. It may then be the means of affording relief to urgent suffering, as when there is dyspnœa with threatening of orthopnœa, and also of extending life. In those instances in which we hope for a cure, it should always be held in mind that the success of the operation must greatly depend upon the condition of the system generally, upon the amount of strength, and the state of the visceral organs. Louis long ago pointed out this fact to be held in view. Impairment of the digestive and assimilative functions retards the well-doing of the patient; and, if there be renal disease and a lowered tone in the vital powers, the issue becomes very doubtful. It is beyond dispute that it is, like tracheotomy, far more successful when employed early than when employed late; as I have already remarked, before false membranes and fibrinous deposits bind down the lung and become organised. It is generally difficult to determine the precise time when operative interference should be tried. There is mostly a desire, not only on the part of the physician, but on the part of the patient, to give other and milder remedies a chance. If this waiting for the effects of medicines be protracted, much valuable time may have been lost. It is well that the inflammatory and more acute symptoms be first subdued. Hamilton Roe thought the fluid should not be left beyond the third week, as he believed that no real cure resulted if it were deferred until the fifth or sixth week; and Tuke of New York believes that re-expansion of the pulmonary substance may take place even at the end of between two and three months. There is, however, no occasion to wait such length of time when we see the patient from the setting in of the acute stage. But it often happens that cases go on for weeks before a decision is come to as to the operation. Absorption has been waited for, or, what not unfrequently occurs, the presence of the fluid has been overlooked. Sometimes it accumulates in an insidious manner, and I have known instances where effusion has long existed without any suspicion whatever of any collection in the pleural sac. I believe that no hard and fast rule can be laid down as to the period when the lung will re-expand; its expansion is dependent on many circumstances. When we know the fluid to be purulent, as may be ascertained by a grooved needle or the aspirator, there need be no hesitation in our resolve. It would be sheer folly to lose any time after such fact was demonstrable.

I have remarked that two fears have been entertained which have opposed the more general use of thoracentesis; and these have been the fear of syncope following the operation, and the fear of the admission of air into the pleuritic cavity. I have never known any danger attending the operation. With modern instruments there is no danger of wounding the viscera, and thus producing syncope, as it has been dreaded, by hæmorrhage.

The evil consequences of the admission of air into this serous sac have been very unduly dwelt upon; nor do I believe that a moderate amount of air passing into the chest is followed by those deleterious effects which some have imagined. In the patient whom I saw with Dr. Farrington of Penshurst, and in whom the purulent collection forced a spontaneous outlet through the bronchial tubes, air must necessarily have passed at once freely into the thorax, as pyopneumothorax supervened; but the patient improved immediately after the exit of the fluid. In other cases that I have known in which the same event occurred, the admission of air into the cavity seemed to do no harm. Numbers of cases of pneumothorax do well. Dr. Fuller says the admission of air into the pleural cavity is a fallacious dread. Again, he declares that all mechanical contrivances to exclude air are worthless; and he maintains that the admission of air is of no importance. Anstie asserts the almost impossibility of excluding air when the fluid is instrumentally drawn off. Trousseau quotes the opinion of M. Reybaud on this subject. The latter thus speaks on the point in question: "The introduction of air into the pleural cavity is an almost inevitable occurrence, and one, moreover, regarding which no anxiety need be entertained." We know that, in pyopneumothorax, the patients recover when constant and large quantities are admitted. Davies never saw the admission of air set up inflammation. Dr. F. Bird stated that on the twenty occasions on which he had operated air had been admitted; and that he had never noticed even uneasiness caused by it. Bergeret and Sutton contribute the same kind of testimony, and say air may be admitted without any evil effects. Though I fully coincide in the opinions of these authorities, yet, as it is so easy a thing to exclude air by placing the free end of a piece of gutta-percha tubing used with the trocar under water, I have generally done so. If air be not demonstrably harmful, there can be no advantage in letting it in when it can with such facility be in a great measure kept out.

It has been held in dispute, whether the chest ought or ought not to be emptied at the first tapping. So far as my own experience warrants the expression of an opinion, I believe it is well to take away as much fluid as possible at the first operation; nor have I ever observed any ill effects from so doing. Roe and others say the pleura may be emptied without danger. The fear of syncope being produced by the prop formed, as it were, by the effusion, being suddenly taken from the heart, is, I believe, more imaginary than

real. In twenty-four cases operated upon by the last-named physician, and in some of which pints of liquid were drawn off at one time, no tendency to syncope was observed. In cases in which the heart has been displaced beneath or to the right of the sternum, or when it has been pushed down towards the left hypochondrium, or it may be inwards and backwards, such dislocation, as I have already observed, cannot be effected without more or less twisting of the great vessels, and interference with free systolic and diastolic action; and fatal syncope is more to be dreaded when this vital organ is persistently pressed upon, than when it is assuming, or has quickly assumed, its normal position. I know of no instance in which sudden death followed tapping from such causes. Walshe says that, when thoracentesis is employed merely as a palliative in phthisis, the fluid may be drawn off by degrees. I cannot, however, see the advantage of this recommendation, as it is always desirable to discommodate and harass the patient as little as possible. I have advocated the letting out of as much fluid as can be conveniently removed; but there is no need to be solicitous for the evacuation of the last drop, as such would in some instances give rise to a good deal of fatigue and distress.

Again, there is always a certain quantity left in the cavity, which, when the case does well, is readily absorbed. It often happens, even when a moderate amount of liquid is removed, that the mechanical disturbance is very manifestly relieved, and that the absorbents then take on such activity of action as to accomplish the entire disappearance of the effusion. As Sir Thomas Watson remarks, it is very probable, when the serous membrane is stretched by its contents, that its natural absorbing power is much lessened. With the diminution of pleural tension, as Hughes and Cock long ago maintained, other remedies are rendered more operative. When the organism is relieved of an incubus of this kind, there seems to be a compensating energy instituted in functional action, just as we see, after paracentesis abdominis, and even after free puncturing of the legs in anasarca, how remedies will become effective, as, for instance, how efficiently diuretics will then act, after they have been long and fruitlessly tried.

Paracentesis Thoracis.—Those conditions which may be regarded as the morbid states, and the positive and negative signs demanding the operation, may thus be concisely summarised.

1. In all cases in which inspection and the physical signs give evidence of a large quantity of fluid: when there are symptoms of compression of the lung, and there is manifest cardiac displacement.

2. When there are urgent dyspnoea, an irregular pulse, and threatening of orthopnoea.

3. When the affected side is smoothed and rounded, and the intercostal spaces are effaced or protrude; when measurement proves bulging; when the dullness in the chest is complete, or demarcated,

and absolute ; when there is abolition of tactile fremitus ; when there are bronchophonic voice, tubular breathing, and absence of breath-sound ; when the patient can only lie on one side, or in diagonal position ; and when there is the Hippocratic sign of succussion.

4. When the exploratory needle proves the fluid to be purulent.

5. If the heart be pushed from its normal situation, and the apex-beat be substernal or beyond the right sternal edge, or if it be thrust towards the left hypochondrium, or if it be lost ; when it becomes presumptive that the organ has been driven inwards and backwards ; and when on the one side the liver depends abnormally into the abdomen, and when on the other side the relaxed and down-pressed diaphragm so displaces the spleen that its free edge can be felt.

6. When half the thoracic cavity is filled, and a month or so shows no proof of absorption, the longer the delay the less are the chances of expansion.

7. In those exceptional cases of double pleurisy when both cavities become half filled with effusion, and dyspnœa shows the lung-space to be dangerously encroached upon.

8. In pulmonary phthisis, when the accumulation of serous or seropurulent secretion causes distress, and when the other lung assumes the symptoms of bronchitis or pneumonia, the operation should at once be performed.

9. In mechanical hydrothorax, it may be had recourse to, though with no object to cure, but with merely a view for a time to prolong life and to aid the action of medicinal remedies.

10. In children, whose chest-walls are thin, and in whom the white tissues are more developed and confer greater resiliency to the thoracic parietes, and whenever there are certain evidences of fluid, it should without delay be evacuated.

11. In hydropneumothorax, it may be generally with safety and benefit employed.

12. Pointing externally should never be waited for.

13. Under certain circumstances, repeated tapplings are required.

Much has been said and written relative to the place and mode of *operation*. There was an ancient practice of perforating a rib, as revived by Reybaud, and also of producing an eschar by the potential or the actual cautery. It is never advisable to injure the rib, because caries or necrosis may follow. Indeed, in old-standing empyema, when tubes have repeatedly been inserted, and the periosteal covering has been continually pressed upon, caries is not an uncommon result, despite of all the care which has been observed. The modern place of election is always at a costal interspace. In passing, it may be mentioned that the grave mistake has been made of puncturing the sound side, when air of course instantly rushed into the cavity, compressed the lung, and caused sudden death. Sheer carelessness, or utter ignorance of the physical signs, could alone give rise to such a catastrophe. It would be well never to depend

on inspection and the obvious increase of size in one side, because in empyema and in long-standing effusion there may be costal approximation and thrusting down of the diaphragm on the side of the disease, rendering the thorax smaller; and the unaffected cavity may have become distended by the increased volume of the compensating lung, as I have before pointed out. Percussion and auscultation will always rightly solve the question. At some parts there may be adhesion of the pulmonary tissue. That part should be avoided; and the spot for the introduction of the trocar should be determined by reference to physical signs, and any place should be avoided where there is not characteristic and absolute dulness on percussion. Laennec, Townsend, Stokes, and others, prefer the fifth or sixth interspace in front of the digitations of the serratus magnus.

The seventh interspace is above the bottom of the sac at the posterior part of the pleural cavity. The diaphragm comes down from the seventh to the eleventh rib, and the floor of the cavity extends down to the eleventh and twelfth intercostal space. The acute angle at which the diaphragm rises leaves but a wedge-like space for the border of the lung. But when there is effusion, and more especially considerable effusion, this space becomes distended and loses its normal lines of configuration; and if care be not observed when the puncture is made at the back base, the trocar may pierce the diaphragm beyond the space, or even the instrument might enter the liver. Again, there may be—as sometimes occurs—adhesion of the diaphragm to the posterior chest-wall, and real union of surfaces may be low down; hence another and cogent practical reason for making the puncture higher than the floor level.

If there should be pointing, such ought to be the place of opening if it be below, but not otherwise. Bowditch says the best spot is between the ninth and tenth ribs, in a line let fall from the lower angle of the scapula. But this physician goes on to say that, in selecting the precise intercostal interspace at the back, he usually chooses one about an inch and a half higher than the line on a level with the lowest point at which the respiratory murmur can be heard in the healthy lung of the opposite pleural cavity; and he adds that he has even tapped in the axilla or in the breast. Sometimes œdema renders it difficult to fix on the spot for penetration. It is then desirable to carefully press with the pulps of the fingers until the ribs can be distinctly felt. Davies has given the opinion that in all cases an exploratory needle should first be passed. I have not, however, been in the habit of adhering to this precaution, because, in a nervous patient, the introduction of two sharp instruments might seem to give unnecessary pain. When there is not an absolute certainty of the presence of fluid, to first push in a grooved needle may be very desirable. I prefer the flattened trocar, to which is attached, at the free end, a piece of gutta-percha tubing

which is to be carried under water. No instrumental contrivance is simpler and more effective. The fluid is thus generally drawn off quickly and completely. On four occasions I have recommended the use of the aspirator, which is really but the return to an old practice of drawing off the fluid by a syringe; and it is as old as Scultatus.

The objections which I have found to the aspirator are, the long time it takes to get away a large quantity of fluid, and the consequent fatigue which is given to the patient. In case No. 14 it was used by my colleague Mr. Marsack. The instrument became far less easily worked towards the end of the operation; and such was the fact which I noticed on two subsequent times of its employment. In No. 16 the withdrawal of the fluid took a long time when Mr. Bishop operated, and the patient became a good deal fatigued. When he was a second time tapped, Mr. Bishop used the ordinary flattened canula, when the result was far more satisfactory. I must confess I have not, like others, found its superiority over the simple trocar. When the trocar is used, Reybaud's plan, as recommended by Trousseau, may be adopted, by tying a piece of gold-beater's skin round the mouth of the canula, so as to form a valve or curtain, which allows the fluid to pass out of, and prevents the air from passing into, the cavity. The skin should be firmly stretched by the index finger and thumb; and a longitudinal incision about six lines in length, coinciding with the intercostal space, should be first made. This facilitates the insertion of the trocar. Care should be taken that the stilette be sharp. A blunt instrument may push forward the pleura, thickened and rendered tough and tense by the union of false membrane, when the operator would be balked. It should be passed quickly, and as closely over the edge of the under rib as can conveniently be done without lacerating the periosteum; and the curve should be slightly upwards, when the opening becomes somewhat valvular. It should not be pushed in further than to fully clear the chest-wall; but, when the stilette is withdrawn, the canula may be sent in deeper. A broad bandage should be applied round the lower part of the thorax, when the diaphragm would be pushed up to resume its normal position. The patient's trunk may be made to incline towards the operator, or sometimes the operation answers the best when the patient is placed in the recumbent position. The orifice should be at once closed by means of a piece of carbolic plaster.

The operation may be repeated several times. Bowditch says he tapped one patient eight times, and a lady he tapped nine times in eight months. In empyema, even when absorption has gone on after the first operation, it is often well to tap again. When the fluid is being emitted, it may be well to request the patient to draw in full inspirations, and thus the pressure of the atmospheric air is favoured. Sir William Jenner told me of a curious case in which only a few teaspoonfuls could be got out of the chest by the

aspirator, and when the chest was known to be full. After death it was found that a tumour, formed by greatly enlarged bronchial glands, so pressed upon the tubes and lung, that no air could pass in; and, as he observed, the fluid would not flow because the same physical reasons existed as when a full cask is tapped, without a spile-peg being put in. When drainage is resolved upon, the drainage tube should be introduced at the upper opening, and the lower opening should be as much as possible on the floor of the sac. A long and curved sound may be carried in its point, being passed low down at the chest-wall, and when the point by pressure is by slight elevation indicated, it may be externally cut open, and the communication is then readily effected by means of the drainage tube. When the ribs closely approximate, the wedging in of the handle of the scalpel will be sometimes sufficient to render their edges apparent; and when such is not the case, one or both ribs may be perforated. Returning to what has been said relative to tapping, when the fluid is purulent, the orifice may be kept open, and the injection of warm water may be had recourse to two or three times a week. I know one instance in which the chest was thus washed out for some time daily, and the patient made a full recovery. Radenbacher records the case of a boy who was tapped, and whose chest was twice daily washed out with warm water; and he made a full recovery. The late Mr. Stanley of St. Bartholomew's told me he had, in these cases, seen the best effects from washing out the cavity with warm water. I cannot give any such experience of medicated injections as to speak with any authority. Carbolyzed lotions, weak solutions of iodine and Condy's fluid have been by some employed.

In children paracentesis can, as the rule, be performed with much and immediate benefit. In these little patients the diagnosis is easier; the lymphatic exudations less rapidly become organised, and absorption is more actively carried on, than in the adult. The flattened trocar, as before recommended, is the best instrument. In children, when the parietes are stretched with liquid, they are so thin as not to require the longitudinal incision through the skin. Again, in them it is most desirable to avoid unnecessary pain. Drainage-tubes, when had recourse to in children, sometimes set up a good deal of irritation. When the effusion is purulent, as it so frequently is in children, it is a good plan to employ a small silver tube like that used by Mr. Marsack in case No. 17. It need not be longer than to fairly clear the chest-wall, and care should be taken that the inner edge be perfectly smooth. The accident of its slipping in can be guarded against by the outer extremity ending in a button-like shield from six lines to an inch in diameter. Kussmaul recommends that, in these cases in a child, a small silver canula should be kept in. He also advocates the injection of sulphate of soda and camomile-tea, to prevent the absorption of pus, which, he believes, gives rise to tubercle. Eyelet-holes for the

introduction of a piece of tape should be made at two opposite edges of the shield. This little instrument can then be firmly fixed, and thus little or no irritation is transferred to the chest-wall. The orifice of the tube can be closed by means of a piece of lint and adhesive plaster. These being taken off, the chest can, by the child merely leaning towards the affected side, be relieved of the accumulated secretion every morning, as this practice was with such advantage adopted in Mr. Marsack's case. This fixed shield also admits of the chest being freely washed out with warm water. The water can be injected by an ordinary syringe, and it will run out again by merely inclining the trunk to the position which favours its exit. When the effusion is of recent formation, and serous, one operation will often suffice; and even if the whole of the fluid be not taken away, absorption will generally succeed with such activity as to be followed by speedy recovery.

A curious phenomenon, as the sequent of thoracentesis, was much commented upon in France, and, indeed, it there led to some very animated discussions. M. Pinault first pointed out the singular fact that not unfrequently *albuminous expectoration* quickly follows thoracentesis. MM. d'Espine, Woillez, Marrotte, Béhier, and Terrillon have called attention to this question. The symptom, it is stated, may come on from ten minutes to an hour after the operation, and continue for several hours, or an entire day. There is said to be a correlation between the quantity expectorated and the mildness or gravity of the symptoms. In mild cases the secretion is but in limited degree, but very abundant in the severe examples. The disturbance which it causes may be merely slight dyspnœa, or there may be distressing and acute dyspnœa, spasmodic cough, and fine subcrepitant *râles*; and, in fatal cases, the dyspnœa has been most urgent, the cough continuous and suffocating when asphyxia has supervened, and the accumulation of liquids has filled up the respiratory system. This albuminous product, it has been related, is yellowish, coagulates with nitric acid, while the expectoration is mere bronchorrhœa, and the microscope detects epithelial cells, and pus and blood-corpuscles. The point of disputation is how and in what manner is this albuminous fluid produced. Perforation by the trocar, spontaneous perforation, reabsorption after the operation, and pulmonary congestion, giving rise to transudation through the alveolar walls, have all been assigned as causes. In short, without citing arguments to rebut the first three theories, it may here be observed that the last named mode is held to be the most explanatory of the phenomenon. Œdema is the consequence of pulmonary congestion.

When that condition has for a time continued, serous transudation then eventuates, in addition to bronchial mucus; when the lung has been for a long time compressed, and the liquid which has surrounded it and pressed upon it is suddenly removed, the atmospheric air by rushing into the vesicles irritates their mucous

membrane and causes vascular excitement, and hence the sequents. Such is the explanation of certain of the disputants, and it would seem that such explanation is not unfounded on physiological and pathological principles. Those who take this view maintain that the analogue is to be noticed in albuminous nephritis when the Malpighian capillary congestion becomes relieved by a serous transudation into the tubules. Dr. George Johnson lately referred to this subject in a clinical lecture, and thinks another etiological explanation may be given of albuminous expectoration. He attributes the phenomena to absolute blood-stasis in the minute pulmonary vessels, especially in the pulmonary veins. I have before pointed out that coagula in the large pulmonary veins is a condition which takes place in a lung compressed by pleuritic effusion, more frequently than was formerly supposed. It is evident from the examples given, and the reasoning put forth by the French pathologists, that the irritant properties of the sudden ingress of atmospheric air is the most explicable cause of the congested capillaries, and the sequential event of the transudation of serosity.

A word may be said relative to the operation, and the attempts at the operation, in certain of the foregoing examples. In case No. 6, the failure was attributable to widespread adhesion of the lung to the chest-wall. If the fluid could have been reached, the patient would doubtless have been relieved for a time, notwithstanding that the primary malady was tuberculisation. The large amount of serosity caused death by mechanical pressure. The anasarca was mainly due to visceral displacement, and, though the heart was not of itself diseased, the pericardium being filled with fluid, great interference was necessarily given to the normal action of a vital organ. In the other fatal case, No. 7, the operation was easily performed, and the benefit was immediate and decided. As the patient lived some days, her death, which resulted, in an emaciated frame, from asthenia, could hardly with good grounds be attributed to thoracentesis. In case No. 11, the fruitless efforts to draw off the liquid were doubtless from long standing and extensive adhesions. Two punctures were made, but to continue plunging in the instrument when there was no exact knowledge as to the position of the heart, or when there became a great probability of wounding the lung, would have been unwarrantable. In No. 14, I am quite of opinion that the trocar and tube would have been more effective in the withdrawal of the fluid than the aspirator. The large amount of serosity and the immediate comfort and easier breathing which followed, were most satisfactory results. The operation in this man showed most conclusively how advantageously thoracentesis may be used as a palliative in pulmonary plithisis with effusion. In such complaint, paracentesis presents itself to our notice as one of the most decisive and effectual of remedial measures. In the little boy, No. 15, the operation was expeditious and beneficial. Occurring as the effusion did, as the completion with or sequel of one of the

exanthems, it was pretty evident that the fluid would be purulent. In No. 16, the good results of the operation were more speedy and decided than in any other example of my own experience. The youth was gravely ill, extremely emaciated, and unquestionably in great peril. The outcome of the fluid was at once followed by amendment, and his recovery was absolute. In the little boy, No. 17, I have already expatiated on the advantageous employment of the small silver shield-tube.

I shall now give some other cases which had previously appeared in the medical journals, and which have more recently come before me in practice.

CASE XIX.—Here may be given an important, and it might be said an exceptional, example, in which the purulent form may obtain, and for what a long period the disease may exist, yet full recovery eventuate. Many years ago, a clergyman in Cornwall, then thirty-six years of age, stretched himself to take down a book from a high shelf. Immediately he felt an acute pain in his left side, which was so severe that it compelled him for some time to remain seated. In the course of a few days pleurisy came on. The practitioner called in prescribed a blister and other remedies. The disease progressed with little or no amelioration. Another opinion was obtained, when leeches were ordered, which were followed by much benefit. His convalescence was slow and imperfect; and he became so incapacitated that he was unable to do any duty. At the end of three months he resigned his curacy, and repaired to his native county, Yorkshire, in the hope of being improved by the change of air. During the subsequent four years he was an invalid, he lost flesh, had difficulty of breathing, and he went for a time to the sea-side, but derived no benefit. He then applied to a physician of local eminence. When examined by this gentleman the left chest was round and smooth, and the heart's apex-beat was felt to the right of the sternum. The presence of fluid was diagnosed. Paracentesis was performed, and eighteen ounces of purulent secretion evacuated, which was of very foetid description. The orifice was left patulous, for some time many ounces a day flowed out, and when he coughed it came out in a stream. I saw him five years after the attack of pleurisy supervened, when he came to London to consult Dr. Williams. He was then much emaciated, and when he walked there was considerable leaning towards the affected side. The breathing was difficult, the pulse 100, the skin dry, and the stench from the orifice very offensive. The respiratory murmur was in no part audible, except at the inter-scapular space, where distant breathing was heard. After another year he was little or no better.

At his request, and at the end of six years and four months after the advent of his illness, I gained for him admission into St. Bartholomew's Hospital. After his arrival I met in consultation Dr. (now Sir George) Burrows and the late Mr. Stanley. There was doubtless the presence of purulent matter. The external con-

figuration of the left chest-wall, the filling-up of the intercostal spaces, whilst percussion, auscultation, and succussion all plainly revealed the fact. Sir George did not, however, think the fluid in large quantity. I ventured to express the opinion that I believed there was a *large* amount of pent-up secretion. He looked upon the case despondingly, and feared that after any instrumental application the patient would gradually decline and sink from asthenia. At the end of the first week, in August 1858, and after the consultation, I met Mr. Stanley. He then introduced at the oozing orifice a large gum catheter along a tortuous channel of nine inches in length, before the matter began to find its exit. Forty-four ounces of dark, dirty, decomposed pus, which gave off a most offensive sulphuretted-hydrogen stench, were withdrawn. A large quantity, it was evident from percussion, remained, and this we resolved to leave until the following morning, lest too great a shock should be given to the system. The next day other forty-four ounces were, in similar manner, taken away, which presented all the same characteristics. The thorax was then syringed out with warm water, and this was done after each subsequent withdrawal of the fluid. One hundred and twenty-seven ounces of pus were evacuated during the following seven days. The secretion then began to decline, and at the end of three weeks it averaged from thirty to forty ounces a week. He left the hospital on the 10th of September, when the pus only amounted to four or five ounces a day. On his discharge he looked wonderfully better, and in all respects was considerably improved. In November the secretion was reduced to one or two ounces a day. The thorax was, as it had for many weeks been, washed out with warm water night and morning. The medical treatment had been quinine, iron, bitter infusions, and cod-liver oil. He had wine, porter, and a liberal animal diet. To the bowels, kidneys, and skin, sedulous attention was paid. In the month of February 1859 the opening had to be enlarged. From that time the secretion rapidly decreased, and he then recovered without a drawback. He became quite erect, the left thorax had almost expanded to its normal character; the orifice was fully closed; the respiratory murmur could be distinctly traced down to the ninth rib; and he said "he felt as if the air descended into the left lung." There was, however, some præternatural dulness on the base.

In the month of September, just seven and a half years after the first coming-on of his illness, he wrote to me and said: "I never was better, I can now preach and attend to my duties as before, and I am quite well. In answer to queries as to my weight, before my illness I never weighed more than ten stones six pounds. When I left the hospital I weighed eight stones two pounds; I now weigh eleven stones five pounds."

This gentleman, for more than twenty years, has ably discharged the duties of being Head Master of an Endowed Grammar School, and at this time (March 1885) he is a strong and healthy man.

Remarks.—Effusion into the thoracic cavity is always a circumstance of alarming import; and even still more so when the liquid is of a purulent instead of being merely of a serous character. It is the result of a chronic or latent inflammation, and proclaims in the system a want of tone—some constitutional vice,—that condition summed up in the term cachexia. The aplastic or cacoplastic matters thrown out are unfitted for the assimilation of the tissues, and lack the higher vitalizing qualities of those more organizable materials which are eliminated when the cytoblastema is more normal, as in the sthenic types of inflammation. It is when there is a remission of the acuter symptoms that there is exudation into the serous sac; and the same is noticed when the pericardium becomes surcharged with fluid. That semi-transparent, gelatinous product which invests the pleura, and which is so germane to the organism in the higher and more flagrant forms of inflammation, is wanting, and its place is supplied by a fibro-albuminous secretion. Flakes of crude lymph float in the effusions, evincing the attempt nature had made at agglutination, but some peculiarity in the fluid opposes their organization. The presence of pus, as it has been considered excrementitious of diseased organs, possesses the power of conferring its impress to other materials; and when a surface so extensive has once taken to itself this kind of secernent function, it goes on into a condition of chronicity, under which the general strength not unfrequently at last succumbs. The pyogenic membrane investing this large serous sac partakes more or less of the low degree of vitalization of the fluid with which it lies in contact; hence its intervention between that fluid and the surface of the healthier organism tends to prevent those molecular changes, and the operation of those occult laws of vital affinity, which require to be harmoniously carried on in the reparative process.

Again, the pseudo-membrane, which is always thickest where it endues the parietal pleura, very importantly retards the absorption of effused products which require to be removed from the system. In those instances which do happily progress to a favourable termination by the power of absorption, it is probable that such event is mainly attributable to the influence of endosmosis and exosmosis, when the effusion is of a sero-purulent character, and not in excessive quantity, when the false membrane is comparatively thin, and in a constitution naturally strong. By a parity of reasoning, it is presumptive that the adventitious formations, in the case considered, were thick and lamellated, because they had for such a very long time incarcerated a liquid of deleterious nature, and because there was no pointing externally, nor had been any bronchial discharge, indicative of the attempt at spontaneous evacuation. An effusion thus exhaled, by long seclusion becomes debased, and it not only acts as an extruded substance giving rise to disturbance by its mechanical pressure and the greater or less displacement of the heart and lungs, but, by its slow transference into the circulation,

its irritative properties, consequent upon the generation of poisonous gases, rouses the entire system into excitation; and hence are to be accounted for febrile phenomena of the hectic character, the gradual wasting, the pyæmia, rendering the blood unfitted for assimilation, and that increasing debility which at length destroys the patient by asthenia.

One of the most striking facts in this example is the very protracted period of four years and a half during which the thorax doubtless contained fluid, and most probably from the first of purulent character. Mohr relates one case, which he considered a very extraordinary instance, in which it had existed for four years. The instance which I have narrated, like others, supplies a proof of the high importance of a correct knowledge of physical signs, how without that knowledge a serious oversight may be made, and with it how the diagnosis can be confidently pronounced, and relief at once given. In pneumonia, in bronchitis, and in phthisis, the general symptoms are usually sufficient for the interpretation of these respective diseases. In thoracic effusion it is otherwise; then percussion, auscultation, and succussion are of paramount consideration in ensuring an accurate decision. Like, as in the majority of cases, the complaint was in the left side. In thirty-six fatal cases given by Hasse, nine were double, ten in the right side, and sixteen in the left side. Of fifty-six examples by Mohr, nineteen were in the right, and thirty-seven in the left side. Copland, Hughes, and Hamilton Roe notice its predilection for the left side.

Sir Thomas Watson cites several cases in which the breathing was not greatly disturbed. As the general rule, however, dyspnoea is an important feature, and when it is not so urgent, the fluid most probably is in less quantity, has been very gradually effused, and the other lung has been in such a healthy condition as to afford considerable compensation. The giddiness which came on in this case, four-and-a-half years after the attack of pleurisy, and just before the first evacuation of the secretion, showed that all the vital organs were beginning to be seriously interfered with in their functions; and it foreshadowed that which would very probably ere long have eventuated—apnoea or syncope ending fatally. We learn from the foregoing history of this case, for what a protracted period a large quantity of purulent matter may encumber the heart and lungs, and yet the patient may be able to walk about and not be confined to the house—a particular which has been commented upon by Andral. We perceive too, that not only may years elapse with matter pent-up in the chest, but that after it has been taken away instrumentally, fresh pus may in great quantities be daily poured out from an extensive cavity which has assumed this abnormal secretive action; and that such may go on for years longer, and yet the patient make a complete recovery.

When pleuritis terminates in effusion, measures should at the first be had recourse to which are known to promote absorption,

because at the outset the liquid may wholly or partly consist of serum, and thus be more susceptible of being taken up. When an exploratory needle shows pus to be present, the sooner the trocar is introduced the better. There has been, and yet with some is, a prejudice against tapping. This would not have been the fact if it were more the custom to operate early—before the system has become worn down, and the blood vitiated by the poisonous matters carried into its course. The French physicians used to attribute our greater unsucccess in tracheotomy for croup and laryngitis to the operation being too frequently deferred, until the blood has become venoid and the great nervous centres have become fatally acted upon. All agree that this operation is far more likely to be successful before puberty than in adult ages; because the false membranes do not so firmly organize, and thus bind down the lung, preventing its expansion, and because in the young the thorax has greater accommodating capabilities of contraction. Most recommend for the introduction of the instrument the interspace between the fifth and sixth ribs in the adult; and such selection is doubtless the safest. But in children, and in the young, in whom need hardly be suspected hepatic or splenic enlargement, an inferior point of drainage may be ventured upon.

Certain pathologists have maintained that the protrusion of the intercostal spaces is pathognomonic of pus, the cause being ascribed to a paralyzed condition of the intercostal muscles, consequent upon inflammation, and their being in contact with inflammatory products. There can be but little doubt that in the example above given, the patient was much benefited by the daily washing-out of the thorax with warm water. The cavity was thus cleared of decomposed matter, which it would have been difficult or impossible to remove entirely by the syphon or any other means. Mr. Stanley told me of an instance in which for this complaint he had recommended such mode of procedure to be continued for six months, and the patient, a lady, made a full recovery and became robust and strong. The warm water produces no irritation, and when carefully injected it washes out sinuses and laves false membranes, so that only fresh and bland pus can be absorbed. There was another peculiarity in the instance I have recorded—namely the extreme sub-clavicular dulness. The rule in empyema is that the dulness is greatest at the base of the chest, and the resonance increases as the stethoscope ascends. The pathologic explanation to be advanced on this point is, that most likely the adventitious membranes had formed a sort of chamber towards the upper part of the chest, and that this chamber was filled with fluid; because there was more resonance over the mammary region; succussion proclaimed the splash below; and finally because the removal of the secretion removed the dulness. The unquestionable and considerable expansion of the lung was one of the chief salutary changes in the natural promotion of recovery; because the curvature did not remain; because there was no falling-

in at the side; because the introduction of the trocar became more difficult; by its being during the end of his recovery followed by fresh blood, as if from the breaking-down of newly organised substance; and because at last the new growths extruded it. The enlargement of the orifice before recorded was unquestionably, by allowing free exit to the fluid, followed by much benefit.

CASE XX.—I was requested, twenty years ago this spring, to see in consultation the son of a gentleman, a little boy, six years of age, who had for several weeks been ill, the case having been that of pleuro-pneumonia. The more acute symptoms passed off, but still certain unwelcome conditions remained. When we met in consultation the little patient looked pale in the face, and was sitting up in bed. On carefully inspecting the chest, the left thoracic wall looked full, tense, and round. On palpation the intercostal spaces were distended, and a smoothness was given to the fingers. The respiratory sound over the lower third of the chest-wall was abolished. The breathing was accelerated, and the pulse quicker than normal. I gave it as my opinion that there was most certainly a large collection of fluid. The gentleman in attendance could not agree with this decision. The little patient being the nephew of a member of the profession, who is now the distinguished surgeon to one of the largest hospitals in London, he was sent for. On his arrival he remarked that the case was more medical than surgical as to diagnosis, but if we determined on the introduction of the trocar, he should be pleased to do it. I earnestly again urged the great necessity of the operation. The instrument was introduced, when the somewhat loud, whistling noise of pent-up air was at the first heard; this was immediately succeeded by the outcome of rather thick pus, and twenty ounces of the same purulent fluid escaped. The orifice was at once closed by a piece of adhesive plaster. Altered configuration of the thoracic wall, greater resonance, and freer breathing readily followed. The boy had a cough for three months afterwards, and often during the act of coughing a considerable amount of purulent matter was expectorated. This symptom then gradually declined, and he made a full recovery. At the age of fourteen or fifteen he was considered a great runner by his school-fellows, and could beat most of them in long runs—proving the healthiness and full expansion of the once compressed and diseased lung. He has never had any other illness. Three years ago he went to America, and he is now in one of the Northern States, engaged in agricultural enterprises, and at this date (1885) he is the impersonation of health, strength, and hardiness; thus affording another illustration how perfect may be the recovery after empyema, and when serious symptoms have supervened.

CASE XXI.—Many years ago, in the instance of a young boy, whom I was requested to see, I diagnosed the disease under which he had for some time laboured, as being that of a collection of fluid, and most likely pus in the left thorax. A valvular incision was made between

the sixth and seventh ribs, and the trocar was introduced. Many ounces of purulent secretion instantly escaped, and the heart's apex, which had been felt to the right of the sternum, at the end of the operation, receded completely under the sternum. His relief was immediate. The opening was closed up by a piece of adhesive plaster, and he made a quick and full recovery without a drawback.

I may here record another example, which proves how full and complete the recovery may be, after empyema characterised by serious symptoms.

CASE XXII.—Between eight and nine years ago, a gentleman brought to my house his nephew, who for many months had had what was described as being some disease of the chest. He was a boy of fourteen years of age, who looked pale and ill. This was in the autumn. In the previous spring he was taken ill in the country, and treated for what was regarded as congestion and inflammation of the left lung. For some weeks he was under the treatment of a local practitioner, but he made little progress. The late Dr. Sibson, happening to be in that neighbourhood, was requested to meet the surgeon in consultation; and the former gentleman at once pronounced the presence of a large amount of fluid, and he recommended the introduction of a trocar. That instrument was employed, but it is presumptive that the opening was made too high, as no secretion came away. In the course of a few days after, the aspirator was used, when fifty-two ounces of pus at once came away, and at the end of about a week the operation was again performed, when thirty-four ounces were evacuated. The boy did not get well; his breathing was difficult, he could not walk quick, and he looked ill. At the end of other four months my advice was asked. I at once discovered fluid in the left thorax, and recommended that it should without delay be drawn off. Mr. Rix, of this town, performed the operation, when twenty-seven ounces of purulent matter readily came away. During the subsequent three or four weeks seventy-three ounces as a total were let out. The secretion on the last time of the instrument being introduced amounted to little over an ounce. The orifice was closed, and he made a full recovery. Afterwards when at school, he was distinguished amongst his school-fellows for swimming, football, and various athletic sports. He has never had any illness since, and at this date (March 1885) he is a tall, well-formed, and powerful young man, now twenty-three years of age, and the verisimilitude of health and strength.

CASE XXIII.—A domestic servant, aged twenty-five, was admitted into the hospital. It was ascertained that she had had an attack of pleurisy six weeks prior to her admission, which came on in the left chest, with acute pain, cough, and difficulty of breathing, and for which, amongst other remedies, she had been blistered. After the recession of the acute symptoms, there were impeded respiration, inability to lie on the right side, and a sensation of distress on walking quickly or going up stairs. The

pulse remained quick, and there was some emaciation and loss of strength. On inspection the left side looked fuller, smoother, and more plump than the right. Percussion and auscultation left no doubt as to the presence of fluid. The dulness and abolished vesicular murmur extended from one-third to half up the chest-wall. At the upper third the breath-sound was loud and noisy, and there was some degree of dulness at the apex. The case was regarded as one favourable to absorption. The left chest was to be fully painted over, night and morning, with the iodine application, in the proportions of one of the tincture and seven of water, and the half flannel waistcoat to be constantly worn. Iron, quinine, and cod-liver oil were prescribed. Improvement soon became manifest. At the end of three weeks she could lie with more comfort, and then going upstairs produced little distress. When discharged, at all points of the chest-wall resonance had become normal, and only some degree of coarse respiration remained at the base. In this instance most likely the effusion had been chiefly serous, and a good constitution without any other complication formed the power of absorption.

CASE XXIV.—A little boy, eight years of age, was admitted into the Tunbridge Wells Hospital, suffering from pleurisy with effusion into the left chest, the physical signs of which left no doubt as to the presence of fluid. Two days after admission he was tapped with the aspirator, and nearly a quart of clear, straw-coloured fluid was evacuated. This little patient subsequently did well. He gradually increased in health and strength, and at the end of five or six weeks the vesicular murmur could be heard all over the left side.

CASE XXV.—A little girl, five years old, was admitted into the hospital under my care, suffering from pleuritic effusion of some standing. The evacuation of the fluid being at once decided upon, my colleague Mr. Marsack on the following day introduced a trocar, when fifteen ounces of thick, creamy pus came away. The wound was kept open by means of a plug of oiled lint. The pulse was quick, but the temperature normal. On the following day there was great improvement. The dyspnoea, which was such a distressing symptom with the little patient, was much relieved by the operation. Two days after the introduction of the trocar the plug was removed, and fourteen ounces of healthy pus flowed out of the orifice. On the third day, there were seven ounces; on the eleventh day, seven ounces; and on the fourteenth day, four ounces only came away. After that date, the pus was gradually and constantly discharged through a small tube which was introduced, and the quantity of secretion thus passed slowly diminished. A month after her admission, on taking out the tube, three ounces of good pus flowed out. At this date the child's condition was greatly improved. She then took food very well, and every day got up and ran about the ward. The affected side was flattened, and measured at the nipple line an inch and a half less than the healthy

side. The vesicular murmur could, however, be heard all over the contracted half of the thorax. Some degree of dulness remained over the lower third. She was discharged at the end of the ninth week, when the case might be regarded as having terminated in the most satisfactory manner. If in this instance the chest-wall had been pierced much sooner, immediately after the subsidence of the acute symptoms, when the liquid was merely serous, there is no doubt but the child would have made a far speedier recovery. To allow the secretion to continue when it is in too great a quantity for absorption, is to favour the purulent change, when the general health becomes more affected; and then pyogenic membranes are formed, and the lung is thus bound down and rendered adherent to the chest-wall, and lymphic deposits take place; and the apposition of the internal surfaces is prevented, and more or less of permanent contraction of the parietes is often the result.

CASE XXVI.—A boy, aged thirteen, an out-patient of the Hospital, was first seen by the House-Surgeon, Mr. Cleland Lammiman, and no further history of his previous condition could be given beyond the facts that six or eight weeks before he first began to cough, and then complained of breathlessness, and was feverish. He was somewhat emaciated, and there was quickened respiration; the alæ of the nose moved rapidly, and the muscles about the neck corded out somewhat, at each inspiration. His chest seemed as if permanently expanded, he was coughing up a good deal of frothy, pinkish fluid, the heart's action was accelerated, yet the radial pulse was small and of diminished volume, and he could only sleep in comfort in the sitting position. On inspection of the chest the right side was motionless, and the left acted with increased action. On the right side there was on percussion absolute dulness from base to apex. There was no vocal fremitus; slight tubular breathing could alone be heard, and the intercostal spaces were bulging. Loud puerile, excessive respiration was at once discovered in the left lung. There was no anasarca. The presence of a large quantity of fluid was beyond doubt. The symptoms not being relieved from purgatives, diuretics and the external use of iodine, Mr. Lammiman introduced a trocar, and drew off three pints of clear serous fluid, after which the breathing was at once relieved. He did not make the improvement which was anticipated, and he was again tapped, and two pints of sero-purulent liquid were again taken away. After this the boy did well; and the effusive tendency ceased.

CASE XXVII.—The example about to be cited supplies an excellent illustration of the manner in which burrowing may take place through the intercostal spaces, and thus abscess eventuate, external to the ribs, and into the subcutaneous cellular tissue. I was requested by the late Mr. Bishop of Tonbridge to see with him a young gentleman, nineteen years of age. The patient was tall, pale, and thin, with light hair and glistening blue eyes. At a

glance it could be seen that he was a person of more than ordinary intelligence, and it was reported that he had been most studious, and had distinguished himself at a public school. For some considerable time before he had been ailing, but he had not had any great degree of cough, nor had there been any spitting of blood. He had, however, without any very apparent cause, lost flesh and strength; his friends became uneasy, and they placed him under the care of Mr. Bishop. When I first saw him with this gentleman there was considerable emaciation, making all allowance for his naturally thin build. On inspection the right chest was evidently larger than the left, and percussion and auscultation gave no uncertain sound as to the presence of fluid. The clinical history and the objective symptoms only could confirm this view of the young man's case. The heart was not displaced, and he could lie on either side; but it was significant that he lost breath when he walked quickly or went upstairs. There was also great tympanitis; the assimilative functions were impaired; and the bowels acted irregularly. The pulse was accelerated, but the temperature not much augmented. Iron and quinine were ordered; the affected side was to be painted every night and morning with a weak solution of iodine, in the proportion of one part of the tincture with seven of water. And he was to wear the half flannel waistcoat which in this article has been described. He was recommended a light and nourishing diet, and to have a moderate allowance of stout or port wine. I saw him again in consultation at the end of a month, when the treatment had had ample time to prove advantageous, if it were to be beneficial. He had made no progress; he was weaker and worse. He was now tapped by the aspirator, when ten ounces of yellowish, turbid serum were removed.

Ten days afterwards my visit was again repeated; he seemed weaker still; the circulation was quicker; the respiration was more frequent; and there was a painful amount of abdominal distension. Between the right costal cartilages and the crest of the ileum there had appeared a soft, oblong tumour, about four inches in length and three in width. It was soft to the touch, and doubtless contained fluid. We resolved to open it. Mr. Bishop inserted a canula, and between five and six ounces of brownish and most offensive fluid came away. There was no doubt but this had burrowed through the parietes, and thus formed a sub-cutaneous abscess. Its evacuation was followed by speedy and decided relief. This patient made a full recovery. He afterwards called upon me immediately before going to Oxford for the prosecution of his studies. He looked well. He had gained flesh. I carefully examined his side, and neither by percussion nor yet by the stethoscope could any indications of his former illness be discovered. In this young man the purulent formation was marked; the absorbents were not equal to the task imposed upon them, and nothing could be more conclusive as to the good and lasting effect of instrumental means.

CASE XXVIII.—A case most analogous to the foregoing recently occurred to me. I met in consultation my hospital colleague Mr. Rix. It was in the instance of a gentleman, over forty years of age, who was taken somewhat seriously ill. He had an old fistulous opening at the third interspace on the right side, which had in greater or less degree given off secretion since the time of his boyhood, when he had pleuritic effusion, which had there spontaneously found an exit. The long and dreary winter and inclement spring had thrown him into ill-health. He had lost flesh and strength; there had been cough and dyspnœa; he had been feverish and slept badly, and his facial indication proclaimed much disturbance in his system. On examining the right side, which for many years had been contracted, there was markedly pronounced dullness, and externally an abscess had formed anteriorly, low down, some inches below the old sinus outlet. It unquestionably contained fluid. Mr. Rix opened it; a lot of purulent matter came away, and it was deemed advisable to place in a tube which should pass through the wall into the thoracic cavity, where an intercostal communication had spontaneously been effected. The tube was allowed to remain. The secretion had thus a free outlet.

The patient was ordered iron and quinine, port wine, and easily digested and nitrogenous articles of diet. Nothing could be more satisfactory; he at once began to mend, and, after a sojourn at Hastings, he was restored to his former condition.

Sometimes the mere evacuation of pus in empyema will promote a cure. In the boy at Kensington, I made a valvular incision between the sixth and seventh ribs, and introduced the trocar pointing upwards; pus instantly escaped—and the heart's apex, which beat right of the sternum, before the operation was finished receded under the sternum. The orifice was closed with a strip of adhesive plaster, and he recovered without a drawback. All agree that this operation is far more successful before puberty than in adult age, because the false membranes do not so firmly organize and thus bind down the lung, preventing its expansion; and because the thorax has greater accommodating capabilities of contraction. Dr. Williams, and most other authorities, recommend the interspace between the fifth and sixth, and unquestionably (especially in adults) it is the safest. In a thin boy, in whom there was no hepatic or splenic enlargement, an inferior point of drainage was ventured upon. At the lower interspace, the liver, spleen, and diaphragm have been wounded.

It has been maintained by Stokes and other pathologists that the protrusion of the intercostal spaces is pathognomonic of pus, the cause being ascribed to a paralysed condition of the intercostal muscles, consequent upon inflammation, and their lying in contact with inflammatory products. This doctrine is denied by Walshe. I believe the gentleman Case XIX. was very materially benefited by daily washing out the thorax with warm water. The cavity was thus

cleared of decomposed matter, which it would have been difficult or impossible to remove entirely by the syphon or any other means. Mr. Stanley warmly advocated this measure, and he told me of an instance in which he had recommended this mode of procedure to be continued six months in a lady, who became robust and strong. The warm water produces no irritation, and when carefully injected, it washes out sinuses and laves false membranes, so that only fresh and bland pus can be absorbed. There was another peculiarity in this example, namely, the extreme sub-clavicular dulness. The rule in empyema is, that the dulness is greatest at the base of the chest, the resonance increasing as we ascend. The pathological explanation to be given is, that most likely the adventitious membranes had formed a sort of chamber towards the upper part of the chest, and that this chamber was filled with fluid; because there was more resonance over the mammary region—succussion proclaimed the splash below; and, finally, because the removal of the fluid removed the dulness. The unquestionable and considerable expansion of the lung was the chief salutary change in the natural promotion of this recovery; and I believe the other filling up was mainly from the organization of agglutinated fibro-plastic products, because the curvature does not remain, and some dulness at the base exists; because there is no falling in of the sides; and because the introduction of the catheter was more difficult.

The next example is one of great interest, and proves to what extreme degree the lung can be compressed, and that the absoluteness of language which people sometimes employ when they tell of such an one living by one lung, is by no means the hyperbole of diction, as instances may occur when such statement is the literal truth. It is one of long-standing empyema.

CASE XXIX.—A dressmaker, single, aged. twenty-two, was admitted into the Hospital under my care. At the time of her admission she was pale, puffy in the face, her legs were swollen, and she laboured under general anasarca. Three years before she had pleuro-pneumonia, and had been an invalid from that time. The least exertion produced great dyspnoea; and on even a cursory view of her symptoms it was evident the case would soon end fatally. The pulse was small, compressible, and irregular, and there was great general prostration. On inspection, the left thorax was larger than the right, and it measured an inch and a quarter more round it than the other side; and the heart's apex was felt at the right margin of the sternum. The left thorax was universally dull; the intercostal muscles protruded beyond the external surface of the ribs; and no vocal tremor could in the least degree be felt, nor was there any vocal resonance on mediate auscultation. Succussion gave no splashy sound. The right chest was præternaturally resonant at all parts. The stethoscope discovered puerile breathing in the right chest, which was unusually loud and clear. The bowels were open, the appetite was bad, and the urine contained

considerable quantity of albumen. I resolved on the operation of paracentesis, and I had spoken to my colleague Mr. Marsack on the subject. She died suddenly during the night previous to the day on which the canula was to have been introduced. Her end was fatal syncope, the usual way in which death takes place when large quantities of effusion are present.

The inspection was made fourteen hours after death. The subcutaneous cellular tissue was generally distended with dropsical fluid, and on opening the abdomen a large quantity of straw-coloured serous fluid gushed out. On removing the sternum, the left thoracic cavity was absolutely filled to overflowing with yellowish, dirty-looking pus, of the consistence of thin cream, which emitted a very foetid odour. Though not measured, there could not have been less than three quarts. When the secretion was removed the lung could not be seen—the cavity appeared empty! More careful examination at length discovered all of the organ that remained. Interposed between a rough, leathery, whitish-yellow, pyogenic membrane and the pleura was a thin compressed plate, eight inches long and six inches broad, which varied from two to three or four lines in thickness, which was a dark red carnified substance, and which on closer inspection proved to be condensed and impervious parenchymatous tissue. This anomalous substance did not in the least degree crepitate when pressed between the fingers, but it had a liver-like feel. The centre of this plate was nodulated, which resembled in contour the upper surface of a mushroom, and of the diameter of a crown-piece; it was of bluish-red hue; it was not covered by false membrane with the normal serous investment, and it was composed of the same solidified, non-crepitant pulmonary substance. To the fanciful mind it looked like an insular eminence which still remained uncovered by the surrounding flood of pyogenic exudation. The right lung was unusually large and voluminous, and the small bronchi and air vesicles seemed as if dilated. The heart was pale, and its vessels and valves were normal. The liver, spleen, and pancreas were of the ordinary appearance. Both kidneys evinced the evidence of long-standing disease; they were lobulated and fatty.

The foregoing description fully exemplifies how utterly the lung may be compressed; nor with such an illustration is it any matter of surprise that in the writings of the older physicians we read of the lung having been *abolished*, *destroyed*, *absolutely wanting*, and like expressions. If in this case the support to which the heart had so long been accustomed had been suddenly taken away, there would have been danger, under its weak and irregular action, of fatal syncope. If she had lived to be tapped, I had decided on the fluid being taken away, not at once, but at different times. But, under any treatment, the case must have ended fatally; such utter binding-down and disorganisation of the viscus left no chance of expansion, and so vast a secreting surface would, it is most presumptive, soon

have worn down the patient, and induced death by exhaustion. I believe, however, there is a greater power of expansibility of the lung in these cases than is generally admitted.

CASE XXX.—A pale, sickly female child, two years of age, was admitted as an out-patient of the Hospital. The mother stated that the child had never been seriously indisposed until about two months previously, when it began in a serious illness, which, from the particulars ascertained, had evidently been pleuro-pneumonia. On examination the pulse was quick and the respiratory action was greatly accelerated, and on being stripped the left thorax was on inspection at once discovered to be larger than the right side. There was also some degree of curvature of the spinal column; the dorsal section was somewhat convex, and inclined towards the right side. The left thorax was smooth and rounded, the intercostal spaces being almost obliterated. On admeasurement there was nearly an inch difference in carrying the tape round the two sides. Percussion over the left thorax gave the dull, dead sound which at once indicated the presence of fluid. This dulness extended from the base to the spine of the scapula, and anteriorly up to the sub-clavicular region. The right thorax was at all parts extremely resonant, almost as resonant as if pneumo-thorax existed. Auscultation over the lower two-thirds of the left chest detected no puerile breath-sound, but some distant tubular breathing. At the upper third there was some coarse, moist crepitation. The respiratory sounds over the right chest were loud and noisy, and at the interscapular space was heard some sibilant rhonchus. The bowels were inclined to be loose. The mother did not at this date agree to the proposed operation of thoracentesis, and the child was ordered the tincture of the perchloride of iron, with small doses of quinine and cod-liver oil. A nourishing diet of beef-tea, pounded meat, new milk, and farinaceous food was recommended, and a small quantity of port wine was allowed daily. Under this treatment there was no improvement; the enervation went on; the pulse became still quicker; and the breathing was more accelerated. Physical signs told of the increase of the effusion. The parents now agreed that the operation might be performed. This little patient was exceedingly fretful, and had become paler and thinner; the pulse was extremely quick, and the respiration was forty in the minute. Our then House-Surgeon, Mr. Manser, introduced a trocar at the fifth interspace, and to the instrument had previously been attached a piece of gutta-percha tubing, the free end of which was placed under water. A full stream of greenish-yellow creamy pus immediately followed, which on being measured was found to be fully twelve ounces. After this purulent secretion had been drawn off, five ounces more of brownish sanguinolent liquid also came away, and this on standing formed loose ill-defined coagula. The orifice was closed by means of a piece of adhesive plaster, and a flannel bandage was carried round the chest. On the following day, to Mr. Manser's surprise, on his visit he found

the child playing about the room, and the mother informed him that the little patient was so lively that she could hardly prevent it playing with the other children. Iron, bark, and cod-liver oil were still given. Nothing could be more satisfactory than the result of this case. In the report a few days subsequently even breath-sound could be heard at the base of the affected lung, and six weeks after, the normal fine vesicular breathing was heard at the bottom of the left chest.

It has already been observed in the discussion of this subject that children are more favourable subjects for paracentesis than adults; and in almost all instances, if the respiration become much increased in frequency, the removal of the fluid may be urged, because in children the general health sooner begins to succumb; their circulatory functions are more active, and when much of the lung substance is compressed great disturbance is conferred to the system generally; because the operation can with little inconvenience be performed; and because the thoracic parietes are more cartilaginous and resilient, and they sooner return to their normal configuration. The probabilities are favourable to the supposition that the fluid is purulent, or sero-purulent, if the initiatory inflammatory symptoms have been marked and of the asthenic type, and if afterwards there have been frequent shiverings. It is not to be forgotten, as before remarked, that the pleura is much more prone to purulent secretion than the pericardium or the peritoneum. Mere serous exudation comes on more slowly and insidiously, under a train of passive and atonic phenomena, and cardiac or renal disease is often the forerunner of this event. When purulent matter is contained in the abdominal cavity, there is little or hardly any tendency to its absorption, and it seems a law in the organism that it should find a sinuous opening either into some part of the intestines, the bladder, or vagina, through the parietes or by way of the psoas muscle, or by burrowing through the diaphragm. There is doubtless greater absorptional power over purulent effusion in the thorax than in the abdominal cavity, and it sometimes happens that an empyema may go on to spontaneous recovery. The last given case was the youngest patient in whom I have recommended the operation of paracentesis. Gurnier of Montpellier tapped an infant of only twelve months old.

When the pus is long incarcerated pyæmia may be the consequence. I believe that in all instances where thoracic purulent formations ensue a pure atmosphere is of great consequence in promoting recovery. Absorption should not be relied upon, even when we presume the exudate to be serous, in those of the strumous diathesis, whose history and symptoms give evidence of feeble and broken-down constitutions; in those who have recently passed through some acute or febrile disease, and in those with whom the inflamed pleura was the local expression of some foregoing and constitutional malady; because all these states presuppose a lowered tone of vital action; and it is only in such examples as we believe

to possess vigour of constitution that we can hope for the system to take up a large quantity of deleterious matters and expel them by the natural excretory channels. In the next example which I shall give it was considered presumptive from the clinical history, general symptoms, and the physical signs, that the effusion was to a greater or less degree purulent.

CASE XXXI.—I was requested by the House-Surgeon, Mr. Manser, to see a little girl, an out-patient, who began with pleuro-pneumonia, and in whom effusion resulted, general anasarca had come on; the pulse was 120, and the respiration quick and difficult. The spine was curved towards the right side, the ribs were in apposition, and the other physical signs broadly indicated a considerable amount of fluid in the right chest. I recommended paracentesis, but the parents very strongly objected to any kind of instrumental interference. Iron and quinine, cod-liver oil with a generous diet and port wine, were requested to be given. I saw her a month after, when in every respect she was much better. At this time there was no anasarca; the spine was more erect; the costal interspaces were more open; the pulse and breathing were much improved; there was greater resonance on the upper half of the right thorax, and coarse crepitation could be heard half-way down the affected lung. Some dulness for a long time remained, but with the exception of some binding-down and adhesion of the organ at its base, which most probably was left as a permanent condition, recovery resulted. And this illustration well shows that in the young, whose visceral organs have not undergone morbid changes, and when the secretory functions are in activity, many cases, even if left to the efforts of nature alone, would go on to recovery.

I shall now give some other proofs, in addition to those already given, that in healthy subjects even large quantities of effusion may be taken up, the lung again expand, and normal health be restored. Such instances are most instructive, because they show that in rightly selected cases we may place not a little confidence in the *vis medicatrix naturæ*. When improvement sets in we soon have the unequivocal signs of amelioration.

CASE XXXII.—A farm labourer, aged fifty-three, of florid and healthy complexion, became an in-patient of the Hospital, and under my care. He had been a hale and healthy man until a month prior to admission, when he had an attack of acute illness, which, from the particulars elicited, left no doubt of its having been pleurisy.

On admission, the breathing was greatly accelerated by trifling exertion; and going upstairs, and even quickening his walk, at once induced dyspnoea. Inspection showed the left thorax to be full, smooth, rounded, and bulging. The intercostal spaces were obliterated, and on measuring the left side, from ensiform cartilage to spinal process of the ninth dorsal vertebra, it measured fully two inches more than the right side. Pulse 92; heart's apex felt

abnormally towards mesial line; percussion at all parts of right thorax clear, and the resonant pulmonic note was elicited at sub-clavicular and super-clavicular and super-spinal scapular spaces. Left axilla, left mammary region, and the whole of the left thorax below the spine of the scapula were dull; over two-thirds of the left back the dulness was in very marked degree. Auscultation discovered loud, noisy, puerile breath-sound in right thorax generally; some large, coarse crepitation at left axillary and mammary regions; over the lower two-thirds of left thorax the respiratory murmur was abolished. No vocal resonance nor vocal fremitus over dull space. Had had shiverings and perspirations. Tongue tolerably clean; bowels open; urine normal. Being of opinion, from the vigour of this man's constitution, and the uninterrupted good health which he had enjoyed, that his was a case well fitted for venturing upon the power of absorption, I resolved upon trying it. He took the tincture of the sesquichloride of iron and quinine thrice daily; the bowels were kept in regular action by laxatives; he was blistered twice, and afterwards iodine ointment was applied to the side night and morning; he was put upon extra animal-food diet, and had a liberal allowance of port wine. Under this treatment he soon began to improve; the breathing became slower and easier; the pulse less quick; the skin softer and more natural. In a fortnight the left thorax measured only one inch in excess of the right; the dulness receded, and coarse crepitation could be traced lower down the back.

One month from his being admitted, he was discharged, feeling himself equal to resume work. The physical signs had made still further progress. The left thorax was not larger than the right; the costal interspaces were delineated; respiration and circulation almost normal; whilst percussion and the stethoscope testified to the excellent progress he had made. Eight months afterwards I carefully examined him. He had quite recovered, and had for "several months considered himself well." The breath-sound could now be heard to the base of the left lung, and an insignificant amount of dulness (doubtless the result of pleural adhesion, and most likely some false membrane), which was attended with no inconvenience, was all that remained.

CASE XXXIII.—A tall, muscular, well-built young man, nineteen years of age, presented himself as an out-patient at the Hospital on it being reported that he was in "deep consumption." A cursory examination of the chest showed his complaint not to be phthisis, but effusion. I recommended him without loss of time to come into the institution, and he was received as an in-patient under my care one week afterwards. His occupation had been that of a gardener. On admission, he looked exceedingly pale and sickly; the mere effort of walking produced discomfort; even going upstairs or any extra exertion was accompanied with much dyspnoea. On being interrogated, he replied that up to five weeks prior to his admission

he had never had a day's illness. A month before admission he was taken suddenly with pain in the left side, and it soon became so considerable that he could not draw a deep breath, and it was soon accompanied by cough, thirst, and feverishness. He applied to the surgeon of the village where he then was, and remained under that gentleman's treatment until the acute symptoms had subsided; but as the breathing remained difficult, and there was great debility, he was recommended to go home. He had not been blistered, nor had any external remedies been addressed to the chest. He now complained of great uneasiness and sense of suffocation in the left thorax. Pulse small, 96; respiration shallow, 28. On inspection, left side smoother, fuller, and more immobile than right, and intercostal spaces tight and convex. On drawing a tape from ensiform cartilage to spinous process of ninth vertebra round left side, it measured $16\frac{3}{4}$ in., and on thus measuring right thorax, it barely measured 16 inches. Heart's apex distinctly felt to right of mesial line. Percussion below and above both clavicles clear; right posterior thorax at all parts resonant; mammary region at left side dull; posteriorly, great dulness over lower two-thirds of left thorax; pulmonic note utterly lost, and each stroke on pleximeter gave but a short, dull, dead sound; not the least vocal resonance or vocal fremitus; and no ægophony. Auscultation of right side, externally and posteriorly, detected puerile vesicular breathing; coarse respiration at upper third of left lung, mixed with patches of moist crepitation, and vocal resonance increased; and very faint, distant, indistinct murmur heard over middle third of left back, and at base it may be said there was no breath-sound whatever; he could not lie on the right side; had shiverings and night-sweats; towards evening more or less pyrexia; bowels open; appetite good; urine under the various tests exhibited no morbid products.

In this instance, as in the foregoing, it was a question with me whether I should have paracentesis performed, or rely on the powers of absorption. With regard to the nature of the case, its history and the subjective and objective symptoms left no doubt. Here was a powerful youth, in the high vitalism of opening manhood, who prior to this illness had had perfect health, without the conformation of, and, so far as I could make out, any hereditary tendency to phthisis, and I decided that it was an instance in which absorption might be tried. He was ordered quinine and dilute sulphuric acid three times a day; he was blistered twice, and the bowels kept in gentle action; he was ordered extra diet, and eight ounces of port wine per diem.

Two months after coming into the hospital, he left the institution, feeling so well that he was able to resume work.

Entertaining as I did great interest in this case, and not having heard of the patient since he left the infirmary, I sent a message to the young man (who lived several miles distant), desiring him to come over and see me. In compliance with this request, he three months subsequently came to my house, when I was greatly and

agreeably surprised at his altered appearance. He now looked fresh-coloured, fat, and well, the tongue was clear, the appetite good, the bowels were regular, the pulse was seventy-six, and the respiration natural. Many weeks previously he had resumed work. On examination I could detect no difference between the two sides, the heart's apex had returned to its normal position; percussion nowhere gave dulness; and no morbid sounds could be heard. He could run without distress and pursued his occupation with competency and ease.

CASE XXXIV.—A young woman, nineteen years of age, fresh-coloured, and whose volume of flesh was good, was admitted into the Hospital. She had suffered from a recent attack of pleurisy, and from the more acute symptoms of which she had gradually recovered. She complained of weight and uneasiness in the right side; the breathing became accelerated on trifling exertion, and much distress was experienced on going upstairs. She could not lie on the left side. On inspection the right thorax seemed fuller and more rounded; and it felt smoother than normal when the palm of the hand was passed over its surface. There was less motion in the right than the left side during respiration. Percussion discovered absolute dulness over the two inferior thirds. The left chest was everywhere resonant, and the præcordial impulse was felt over the normal area. Auscultation gave no vesicular murmur over the dull region, distant tubular breathing being alone audible. The physical signs plainly indicated fluid. She was ordered to take iron and quinine, and cod-liver oil, and when the bowels required moving to have a compound rhubarb and hyoscyamus pill. The affected side was to be freely painted over night and morning with one part of the tincture of iodine and seven of water. She had extra diet, and was desired not to take much exercise—in other words, to remain quiet, and keep the heart's action subdued. She soon began to improve—coarse crepitation heralded the way to finer breath-sounds, percussion gave more resonance; she could go upstairs with more comfort, and before long she could lie on either side. At the end of nine weeks she was discharged. When she left the hospital respiration could be heard nearly to the base, and a little dulness, most probably the result of some organized materials with some cohesion, only remained. She looked and felt well.

CASE XXXV.—Mr. F., a well-built man, fifty-eight years of age, consulted me. When he came into my study he was breathing in a short and hurried manner, and remarked that the moderate ascent which he had made in coming up to my house had “taken his breath.” He told me that half a year before he had had a pleuritic attack, from the illness of which he in a great measure soon recovered, but his health since that time had not been what it was before. He complained that a little exertion now tired him; that going upstairs took away his breath, and that he felt full and tight in the left, and could not comfortably lie on the right side. The pulse intermitted; there was a drawn, anxious expression in

the face, and he felt low and despondent. Inspection showed a loss of expansibility, and a smoothness of surface of the left side. Over the lower third, or nearly over the lower half, of this side there was the characteristic dullness. There was scarcely any vocal fremitus, and the præcordial impulse was fuller than normal. Auscultation over dull area gave no puerile breathing, but only tubular sounds. It was clearly a case of effusion as the remains of the pleurisy which he had had in the spring. I resolved, at all events for a time, to try the powers of absorption, and the same kind of treatment as that which I have in repetition described was ordered. As he began to improve occasional doses of the Karlsbad salts were prescribed, and he was desired to live well and keep as quiet as possible. His progress was most satisfactory. The last time he came I could hear the breath-sound down to the costal edge; he then breathed easily and fully, had no discomfort in going upstairs, could lie on either side, the heart's impulse was strong and regular, and he said he "felt the air go well down into his chest." At the end of six weeks he was quite well.

In this, the last example to be recorded, an apt illustration is given of the disastrous results which may eventuate by a wrong diagnosis. It points also to the necessity of a thorough examination being made of the thorax down to its base.

CASE XXXVI.—A gentleman, a retired naval officer, a well-built, fine-looking, and fresh-coloured man, of between forty and fifty years of age, came to my house to consult me. This was not very long ago, and in the autumn. He said that during the earlier part of the spring he had inflammation in his right side. He was at that time under the care of a well-known general practitioner in the country. In the course of time the acuter symptoms of his illness passed off. But he did not get well. A feeling of discomfort and heaviness remained in the affected side, for which counter-irritation and other remedies had been employed. His disease was by this gentleman regarded as an affection of the liver. After the elapse of some months he went to London and consulted a hospital physician of eminence, who told him that he had a chronically enlarged liver, which had depended below the costal border, as there its edge could be well felt. He took the remedies prescribed; but with no benefit. He then came to Tunbridge Wells for change of air. When I requested him to take off his clothes and carefully examined him, it was at once most conclusive by inspection, palpation, percussion, and auscultation, that there was in his right chest a large quantity of fluid. I gave this opinion very confidently, and urged a surgical operation. To this he would not agree, and left my consulting-room, evidently feeling convinced that I was wrong. In the course of a few days he came again. With much emphasis I again urged the operation. He then agreed. I requested Mr. Marsack to meet me in the case, and he introduced the trocar, when thirty-six ounces of clear, straw-coloured serum were drawn off. The relief was immediate.

The liver receded up under the costal edge; and in the course of two or three weeks he left Tunbridge Wells quite convalescent.

SUMMARY.—Of the 36 cases above given, 24 were in males, and 12 in females. The average of their ages was twenty-four years; 10 were from two to ten; 8 from ten to twenty; 5 from twenty to thirty; 8 from thirty to forty; 1 from forty to fifty; 3 from fifty to sixty; and 1 was aged sixty-five. In 12 the disease occurred in the *right side*; in 23 in the *left side*; * 17 recovered through medical treatment and various external applications employed to promote *absorption*. In 17 the *trocar* or *aspirator* was employed. In 6 the fluid drawn off was *serous*. In 11 the secretion was *purulent*. In 2 the instrument was introduced, but no fluid was emitted on account of adhesion of the lung to the chest-wall and plastic formations. In 1 instance, a spontaneous opening had existed for more than twenty years. On some closure of the passage the canula was employed with great relief. In 1 sudden death occurred from syncope after the operation had been decided upon; three quarts of purulent fluid were found in the left chest, and, also, that the kidneys were diseased. In 1 case the purulent formation existed seven-and-a-half years, and full and perfect recovery resulted. 31 of the 36 *recovered*; 1 was relieved and lived many years after, though the opening remained unclosed; and 4 *died*.

CONCLUSION.—The question as to the fatality following, and consequent upon, thoracentesis has been discussed with not a little interest. It is to be feared that a prominence being given to this matter, an undue impression will be made on the minds of those who are not fully conversant with the subject, and that a dread of, or prejudice against, this commonly demanded and harmless expedient will result. There is no doubt that thoracentesis has within the last few years become a very usual mode of practice, as compared with the past, when it was only in exceptional cases adopted, and hence there is less difficulty in collecting a few sparsely scattered cases in the current literature of the day. It is scarcely needful to further insist upon the comparative freedom from danger attendant in this operation. Trousseau says it is harmless. Niemeyer declares there is less risk in it than was formerly supposed, and terms it an important advance in therapeutics; and various other more recent writers give similar testimony. The event of death when regarded in its pathologic relation to the vital organs, may be concisely spoken of as it is proximately referrible to the heart, lungs, and brain. It may with confidence be asserted that it is much more frequently attributable to cardiac failure or implication than to morbid changes in the lungs and brain. Of fourteen cases collected by M. Foucart from various sources, seven died from syncope; four from œdema of the lungs; and the other three were considered to sink respectively from cerebral anæmia, pulmonary apoplexy, and

* In one case the report does not say in which side the effusions occurred.

embolism. When death occurs suddenly when no operation has been performed, it is in the great majority of instances by syncope, which may be induced mechanically, from cyanotic changes in the blood; and from interstitial mutations in the muscular substance of the ventricles. When there is manifest dislocation of the heart, abolition of the cardiac impulse over the normal area, and consequent great stretching or twisting of the large vessels, and when the organ, as it may be, is pushed away towards the spinal column, the onward progress of the blood wave after each systolic action may be so obstructed by mal-position as to need but trifling exertion or sudden movement to finally arrest the action of the organ.

The quick removal of the fluid whereby the heart and its appendages all at once, as it were, return to their proper place, and thus, being deprived of a long existent prop or support formed by the fluid, doubtless may confer a shock not unattended with danger in an organism which has become greatly debilitated and preternaturally susceptible of such impressions. Again, the abrupt falling back of these parts may free a fibrinous clot, which had been somewhere formed in the irregularities of surface consequent on vascular distension and dislocation, and hence may be valvular blockage and death. Intra-thoracic pressure and displacement may suddenly stop the heart; then, when the fluid is not drawn off, and the arrestment of its functions may momentarily cease when such pressure to which the organ has long been subject is abruptly removed, and these are facts of the greatest practical significance. Even for some hours after the heart's return to its old and natural situation, there may be much loss of its functional power and a tendency to fainting; therefore effort and movement are to be strictly avoided. And when death does occur immediately after the operation it would on enquiry often be found that the patient had been incautiously moved, or unwisely kept in the erect position. I think there is no denial that in certain exceptional cases, from the reasons now given, the operation may expedite the fatal catastrophe. There is another way in which the heart's action becomes gravely compromised in these cases: when there is partial or entire abolition of one lung, oxygenization of the blood is rendered imperfect, the whole volume of the vital fluid becomes more or less venoid, and there is then retention of those effete products which exert a deleterious action on the tissues; the muscular system in especial suffers from the sequential malnutrition; and the heart undergoes enfeeblement of function which tends to the result now considered.

Very analogous phenomena occur in chronic renal disease; from the non-elimination of waste materials a dyscrasial alteration gradually takes place in the current of the circulation, and as one effect amongst other morbid effects, interstitial change comes on in the ventricular walls, and hence abnormality of the cardiac cavities. Again, in long-standing pyæmia protracted absorption contaminates the blood, and like consequences ensue. We know that in maintained pleuritic

effusion, and more especially when pyogenic products have been existent, the fatty waste of the ventricles is apt to take place. Thus, then, there are in the affection now spoken of diseased conditions which may prove fatal independent of the shock of the operation, and the mechanical impediments previously enumerated.

It has already, in this article, been stated that death may be proximately caused by the lungs, consequent upon albuminous exudation being set up by the operation and giving rise to asphyxia. When the heart and mediastinum, relieved from embarrassment, resume their normal attitude, and the diseased lung does not expand, an afflux of blood is sent to the sound lung, and hence its congestion. The evil effect in the surcharge of the pulmonary circulation is doubtless caused by the loss of nervous and muscular tonicity of the small vessels as well as by the loss of nervous and muscular tonicity of the heart, whereby the *vis a tergo* is diminished, when vascular repletion, and more especially when venous congestion, eventuates in transudation. A more fundamental cause of these phenomena ought most probably to be sought for in the nerve centres, and in especial in the vaso-motor system. It has latterly been pointed out that the supervention of suffocative and paroxysmal cough, coming on during the withdrawal of the fluid, should warn us of the probable occurrence of more or less of albuminous exudation, and therefore the further emission of the effusion should at once be arrested.

With regard to the third proximate cause of death, that is, by cerebral implication, such may doubtless occur in exceptional cases by embolism. After the sudden resumption of the heart and great vessels of their natural position fibrinous deposits may be freed and swept on in the current of the circulation, and a piece may be carried in the arterial stream, until it effects blockage in a cerebral branch, when hemiplegia, aphasia, and cerebral softening may result. M. Vallin has related such an instance, and similar examples before and since have been recorded; they are, however, but rare occurrences, and ought not importantly to weigh against the practical decision of drawing off the fluid when a full review of all the circumstances of the case points to an operative mode of procedure, because exceptional eventualities might with equal force of argument be brought to bear against instrumental aid in affections far more common. M. Legroux has entertained the notion that cerebral anæmia may be the immediate cause of death, when the brain is suddenly deprived of blood by the afflux being diverted towards the lungs, but cardiac adynamia in these instances ought, there is little doubt, rather to be assigned as the cause, and such examples are really those of fatal syncope.

Lastly, there are some practical conclusions which may be briefly mentioned. It has already with emphasis been insisted upon that in the majority of sudden deaths under or immediately after the operation the catastrophe is caused by heart failure. Diffusible and alcoholic stimulants should always be at hand. When the pulse

is at all compressible, the instrument should be introduced when the patient is placed in the recumbent position. When the diagnosis is clear and certain it is better not to introduce the exploratory needle, as this then only gives unnecessary pain. Local anæsthesia may be employed. A cotton bandage should encircle the chest, and this should be left to one pair of hands, when it can be drawn tighter as the fluid is emitted. In large effusions it is useless to take away a small quantity. Any conditions, such as failure of the pulse, facial pallor, dimness of sight, and similar symptoms, which indicate approaching syncope, being observed, the trocar should at once be withdrawn. If suffocative cough come on no more liquid should be evacuated. The patient should be so placed as not to require movement for several hours after the operation. A piece of adhesive plaster six or eight inches wide, or a well-applied cotton bandage, may be carried round the chest after the instrument has been taken out. Some stimulant both during and after the removal of the effusion should be given. When the whole of the liquid is not taken away the orifice may be kept open by means of a piece of lint being left in the outlet; or on its removal in the course of a day or two as determined it can be pulled out and the canula again inserted. In fatal cases *ante mortem* clots should be looked for, and the muscular walls of the heart should be more especially examined.

XIV.

CHRONIC ULCER OF THE STOMACH.

THE affection which has been variously termed simple, round, chronic, or perforating ulcer of the stomach is by no means an uncommon disease; and it is very probable—from its latent origin, the absence of acute indications, the often ill-defined and hardly to be said pathognomonic symptoms, and the close resemblance between such symptoms and the symptoms of mere dyspepsia and gastric irritation, and from its presence sometimes being revealed on inspection when there had been no suspicion of the complaint—that it obtains far more frequently than is generally supposed. The ancient writers knew of, and Celsus especially comments on, the affection. Several of the older authors speak of it; and amongst these, the account of Morgagni, from its truthfulness and delineation of the facts, may in particular be mentioned. But the best, amplest, and most correct descriptions are by more recent and contemporaneous pathologists; and most especially may be named those by Cruveilhier, Rokitansky, and Virchow on the Continent, and Budd, King Chambers, Brinton, Habershon, Grisp, and Wilson Fox in our own country. These physicians have pointed out many distinctive characteristics of the ailment, and given much valuable information relative to its clinical history, its pathology and treatment. From the correcter knowledge which we now possess of gastric ulcer and of its symptoms and phenomena, it is by no means improbable that the older physicians mixed up and confounded with it cardialgia, hæmatemesis, and melæna, which are merely coetaneous events or sequents of the malady; and though each or all of these conditions may accompany the progress of gastric ulceration, yet there are cases in which even none of them are produced. It is not a disease of early life; it most rarely occurs before puberty, and the examples which have been given of its coming on before this time are rare and exceptional instances, and most probably some of the few recorded were really rather referrible to cadaveric change, as it is not unfrequently an arbitrary decision which elects between such change and the more moderately pronounced but veritable process of ulceration. Nor is it at variance with fact that the same kind of mistake is liable to take place in other portions of the digestive surface. It is a disease which increases in frequency with advancing years. According to

some statistics, its greatest liability has been found between twenty and forty. It has been roughly estimated that it is perhaps about three times more prevalent in females than in males, and this estimate seems to be borne out by the elaborate tables of Willigk, Miguel, and Crisp. From very large data deduced from observations after death, it may be safely said that ulceration of the stomach or duodenum is discovered in about the ratio of 3 per cent. of the deaths from all causes. Dahlerup, of Copenhagen, records a great excess of this number, and places the average as high as 13 per cent. of all bodies examined. According to the calculations of Brinton, something like thirteen or fourteen in every hundred cases perforate. On the whole, it may be said that the poor and ill-clad and ill-fed are more liable to it than the rich. Copland long ago gave it as his opinion that domestic servants and seamstresses are particularly subject to this complaint. Most writers concur in believing that between amenorrhœa and this pathologic change there is some absolute but ill-understood correlation. Miguel thought the climacteric period, from forty to fifty, produces an influence favourable to the development of gastric ulceration; and Crisp has given facts which seem to point to the conclusion that perforation is rendered more probable in those instances in which there is irregularity in the uterine functions. Rokitsky says intermittents produce them; Engel averred that in 10 per cent. of the cases he had witnessed syphilis appeared to be the cause; and Krauss does not hesitate to attribute the ulceration to hæmorrhoids. There is no doubt that in an anæmic and cachectic condition of the system, in which there is blood-change and a generally lowered vitalism, this form of ulceration is liable to supervene. Again, change in the calibre of the gastric arteries is doubtless not unfrequently a more direct or proximate cause; while may change ensue after severe vomiting, mechanical injuries—as by blows, tight-lacing, girdles, and the like. From the knowledge which we now possess of the morbid phenomena produced by embolism in the brain, the liver, the spleen, and other organs, it is very presumptive that organic cardiac disease importantly enters into the etiology. Embolism may be carried into the gastric arteries, choke up a branch, and be followed by a circumscribed and destructive process. Virchow gives great prominence to embolic obstruction as a cause; and there is no doubt that chronic catarrh of the gastric surface, which in the course of time is succeeded by disease of the vascular walls and thrombosis, ought also to be instanced in the causation.

The following cases will illustrate the affection as it is sometimes observed.

CASE I.—I was requested to see Mrs. P., a married lady, who had been under the care of an eminent London physician, and who was sent to Tunbridge Wells for the benefit of her health. She had had several children, was forty-five years of age, and she told me that her case was regarded as ulceration in the lining

coat of her stomach. There was no emaciation, but she looked pale and anæmic, her pulse was feeble, her appetite impaired, and the bowels were inclined to be costive. She lived in a central part of London, and was much in the house. She stated that for a long period her appetite had been impaired, that there had been pain and fulness after meals, and that at times she was troubled with acid eructations. About twelve months before I saw her she had suddenly vomited a considerable quantity of blood. Since that event her health had been more delicate, and there had been general loss of strength. She had for long been strictly dieted, and regarded herself as an invalid. There was some tenderness and fulness at the epigastric region, with occasional pains, but no tumour or hardness could by manipulation be detected. The other abdominal and thoracic viscera gave no evidence of disease, and it was quite clear, both from the objective and subjective symptoms, that her chief trouble lay in the stomach. A few days after my first visit I was suddenly sent for, as she had vomited a quantity of blood. On my arrival she looked pale and exhausted, and the pulse was rendered soft and quick. She complained much of sickness, and placed her hand over the stomach, where, she said, there was a feeling of weight and discomfort. In a short time more blood was vomited, and she altogether lost nearly a pint. She was placed in the recumbent position in a cool apartment, iced drinks were given, and she took ten-grain doses of gallic acid in thin mucilage every two hours during the remainder of the day. Small quantities of iced soup were at the first only allowed. Hot appliances were put to the feet, and strict injunctions were made that she should be as quiet as possible. The bleeding not returning, the medicine was administered at longer intervals, and for some days she kept her bed, and only took iced food and drinks. In the course of time quinine and sulphuric acid were prescribed, and afterwards the tincture of the perchloride of iron. At the end of between two and three weeks she returned to London. I afterwards heard that this lady had had, up to that time, no recurrence of the hæmorrhage, and that her general health had improved.

CASE II.—I was hastily sent for to see Mrs. H., a married lady aged thirty, who, it was reported, had “burst a blood-vessel.” On my arrival I was shown about half a pint of red, bright-coloured blood, which she had just vomited. The patient was lying on the bed, exceedingly pale, and evidently much exhausted. She was of thin and slender frame, and looked younger than her age. It was reported that about sixteen months previously, one evening when seated at tea, she momentarily felt her mouth to be filled with fluid, became sick, and vomited nearly a pint of blood. The hæmorrhage did not then return, but since that occurrence she had been much invalided. Without loss of time, she took ten grains of gallic acid in thin mucilage, and small quantities of iced drinks were given at short intervals. The hæmorrhage

recurred two or three times subsequently, at intervals of a few hours, and her pulse and general prostration became very alarming. For a time she lay in a semi-unconscious state, the pulse being quick, small, and compressible, the skin cool, and a feeling of nausea being very persistent. Her condition having assumed so serious a character, I was requested to sleep three nights in the house, in order to be at hand in the event of a return of the hæmorrhage. Her general weakness being afterwards so exceedingly pronounced, her friends wished Sir William Gull to be sent for; he, however, not being at home, Dr. Habershon came in his stead. I had then given her both the gallic acid and doses of turpentine. When Dr. Habershon saw her, he thought the bleeding might not return, and advised the continuance of the remedies a little longer. He also recommended, if more blood should be vomited, the free use in large doses of the tincture of the perchloride of iron. The hæmorrhage did not recur. This lady was an American, and subsequently to her first attack she had consulted some of the most eminent practitioners in New York, and the opinion had been given that her complaint was that of chronic gastric ulcer, in which Dr. Habershon fully coincided. For many weeks she remained in an extremely weak and fragile condition. She took quinine and iron, and from time to time other tonics; the bowels were kept open by mild laxatives, and very rigid rules were laid down in respect to her diet. I last heard of this patient through Dr. Habershon, who told me there had not been any more hæmatemesis, and that she seemed to have greatly recovered her general health. During the first forty-eight hours of my attendance, I very much feared death by syncope. It must, however, be borne in mind that alarming quantities of blood may be vomited in hæmorrhage of the stomach, and still recovery be the result, as I have repeatedly witnessed.

CASE III.—The next example which I now give was one very typical of the slow but persistent progress of this complaint. I was requested to see Miss P. L. G., a young lady twenty-six years of age, of whom I was told that she had been for several years an invalid. Her volume of flesh was good, nor was there any marked expression of disease in her countenance. I was also informed that about two years prior she had had for a long period persistent nausea and vomiting, and so continuous and distressing were these symptoms that her medical advisers then feared the consequent exhaustion would end fatally. She slowly recovered from that attack, and in the course of time could digest a prescribed diet. She, however, remained much of an invalid. She had consulted some of the leading men in London, and all whose advice she sought concurred in the opinion of gastric ulcer. She had repaired to various places for change of air and climate at home and on the Continent, and at length came to Tunbridge Wells. When I first saw her she was in bed, and she told me that during the previous three days she had had a return of sickness and vomit-

ing. Her food could not be retained, and, immediately after taking any nourishment, it was ejected. On inspection of the abdomen, there was a rounded fulness over the stomach, and on palpation moderate pressure produced epigastric pain. The line of hepatic dulness slightly exceeded the costal edge, but there was no splenic enlargement. The physical signs of the thorax gave no notable characteristics. The tongue was moist, but coated on the dorsum. Pulse 84, small, regular, and compressible. Bowels confined, and last evacuation was dark and bilious. She was ordered small doses of the bicarbonate of potash, morphia, and hydrocyanic acid. I was in constant attendance on this young lady for some weeks, and the nausea and sickness, beyond very temporary alleviation, defied all remedies. Various medicines were prescribed, but with no satisfactory effects. She had morphia, henbane, conium, prussic acid, creosote, belladonna, and opium. Sedative suppositories, stimulating injections, counter-irritants, and ice to the spine, were tried, but without producing any marked relief. Concentrated soups, milk, and lime-water, jellies, and other bland nutrients, were ordered, but even these were as a rule rejected. Iced champagne was better retained than any other stimulant. When such a scanty amount of ingesta were kept in the stomach, it was not wondered at that she gradually lost flesh and strength. As time went on the wasting became more and more apparent, the lips became dry and parched, and the tongue covered with a silvery coat, the tip and edges looking red and irritable. The eyes assumed a sunken appearance and seemed small in their foramina, and the facies hippocratica ere long was marked, and expressive of her slow but sure decline. With these ominous changes the pulse indicated the diminished column of blood passing through her heart; it was weak, thready, and irregular. Three days before her death the cerebral functions succumbed in the general loss of vital power; she looked around her with astonished gaze in hazy bewilderment. Utter unconsciousness supervened, and she tranquilly sank at the end of seven weeks from my first seeing her. This instance of the disease well illustrated one mode of death which ushers in the final termination—that in which there is gradual and unarrested extinguishment.

CASE IV.—Caroline T., aged twenty-four, single, a domestic servant, was admitted into the Hospital. She was well formed, muscular, and her general aspect did not indicate any important disease. She stated that some years before she began to have attacks of sickness with occasional vomiting, and these attacks would continue for two or three months, and then pass off. She became an inmate of Guy's Hospital, and remained in that institution five months. She was discharged as cured, but was warned that the disease might return. She first became an out-patient under the care of Dr. De Havilland Hall, the then house-surgeon. The leading symptoms of her complaint were constant nausea and occasional vomiting. The ejected matter sometimes contained blood.

On examination at that time there was no marked epigastric dulness, but on circumscribed pressure pain was felt at the stomach, and sometimes this pain radiated through into the back. The appetite was impaired, the bowels were confined, and the tongue was covered with a whitish fur. Pulse and temperature normal. She was treated with a variety of remedies, such as opium, prussic acid, bismuth, alkalies, bitter infusions, and counter-irritation. The diet was carefully directed, and no solids whatever allowed. She made no progress, and at length was admitted as an in-patient. On admission she still complained of pain on moderate pressure being made at the epigastrium. She was also harassed with nausea and occasional vomiting. She was kept in the recumbent position, and various remedies in turn were tried. She derived the most benefit from small and regularly-repeated doses of opium, with the sulphate of copper, in the form of pills. The bowels were acted upon by aqueous extract of aloes in combination with the extract of belladonna. She lived chiefly on soup, crumb of bread, milk, and farinaceous food, lime-water being given with the milk. Under this treatment the sickness and vomiting gradually declined, she could digest more food and had less pain on pressure being made over the stomach. After two months she sat up for a few hours during the day, and was allowed a small quantity of mutton with some well-cooked vegetables. Her progress now became quicker, the nausea seldom occurred, the vomiting had entirely ceased, and she could bear pressure at the spot where before she always had more or less pain. She was discharged at the end of another month, looking healthy and well. Appended to the above particulars of this case in my note-book is the remark that "continued rest in the recumbent position, and the strict rules observed respecting her diet, were most likely in this patient of more service than any medicines which she had taken."

CASE V.—This example is one of much interest, and exceptional in this disease. W. I. C., a house-painter, aged thirty-six, of fair complexion, and not emaciated, was for several weeks an out-patient of the Tunbridge Wells Hospital. He applied at the institution for what he termed a "stomach affection," which was characterised by some pain after meals, which extended through the epigastrium into the back; and he stated that he had occasional attacks of sickness and vomiting. Four years previously he had suffered from painter's colic, which was followed by lead paralysis in both arms, and in each had the kangaroo drop. Three years previously, he had for some time been much troubled with nausea, and then not unfrequently vomited his food. From the last-named illness he gradually recovered, and continued in tolerable health, with the exception of sometimes suffering from pain in the stomach, accompanied with a feeling of sickness. I examined him, when gastric tenderness was felt on pressure, but no tumour or any indurated enlargement could be detected on careful manipulation at any

part of the epigastric region. He was treated in the ordinary manner, and carefully dieted, but without any marked relief. He had unusual pain after a meal, the vomitings were frequent, the acid eructations incessant, and it was but too evident that his complaint became worse. One evening, Dr. De Havilland Hall was hastily summoned. He found that the patient had vomited nearly half a chamber-utensilful of dark blood mixed with coagula. The patient said he felt very faint before the vomiting came on. The skin was cool, the pulse feeble, and there was a tendency to syncope. Gallic acid in full doses and iced water were ordered. On the morning of the following day it was reported that he had passed a good night. He felt comfortable, with the exception of a feeling of nausea. The bowels had been moved, and the dejection was of pitchy blackness, evidently caused by the great admixture of blood. He was ordered prussic acid, with a little bitter infusion; some bland nutrients, small quantities of which were to be given at short intervals; and rest in the recumbent position was enjoined. About nine o'clock in the evening he had another and most alarming attack of hæmatemesis, the floor and bedclothes and bedding being drenched with blood. The patient was rendered rapidly prostrate. The pulse became small and compressible; the skin was cool; there was no pain; and the mind remained clear and collected almost up to the time of his death, which occurred eleven hours after this his last vomiting of blood.

Autopsy, thirty hours after death.—Features and surface of almost marble whiteness, and the body did not appear emaciated. Thoracic organs healthy, but exceedingly bloodless, the cavities of the heart and great vessels being utterly empty. On opening the abdomen a small quantity of dark sanguineous-looking fluid was found in the sac of the peritoneum. On removing the stomach, it contained some dark coagula. At the greater curvature, and nearer the pyloric than the cardiac end, a round cleanly-punched hole, the size of a fourpenny piece, was discovered. On washing the organ and carefully examining the place where this solution of continuity had occurred, the mucous and muscular coats showed a crater-like ulceration. The edges of the ulcer were smooth, rounded, vascular, and elevated above the surrounding tissue. Its narrow apex and funnel-shaped basic expansion towards the mucous surface, when carefully looked at, seemed in terrace-like irregularities, and an amorphous or finely granulated substance covered these strata of the tissues. The subperitoneal cellular formation was augmented in thickness, being rendered more firm by an adventitious and infiltrated product. At about three lines' distance from the elevated annular margin before described was a finely injected zone, which did not rise above the mucous surface. Examined on the peritoneal aspect this perforation was clean at the edges, as if incised, there being no ragged line, nor any lip-like protrusion, which would have marked the difference had the opening resulted in cadaveric rupture.

In cadaverous slit there is no internal thinning and bevelling off of the inner coats—the rent has the appearance of an ordinary tear. Not far from this place of ulceration were seen two other smaller ulcers, in which the morbid process was less advanced. Not a trace of peritoneal inflammation existed either in the stomach itself, or in any neighbouring parts. The solid organs on being incised were notably pale. No other indications of disease were anywhere revealed in the abdomen.

CASE VI.—The last example now given, and in which it is presumptive that there was gastric ulcer, was in the case of Mrs. B., a married lady, aged forty. This patient was born in India, and had passed her childhood there, but since then she had not been in that country. She was rather inclined to be stout than the contrary, and, upon inquiry, the catamenia had not for some time been regular. When I was first requested to see her, she then looked pale and anæmic, and I was informed that she had been more or less an invalid for some years. The thoracic signs were normal, but, on examining the abdomen, I discovered the spleen to be exceedingly large; it depended below the costal edge; the line of dulness could be traced up above the upper margin of the eighth rib, and, on placing the tips of the right hand fingers at the sulcus formed at the outer border of the dorsal muscles, and the ends of the left hand fingers being pressed in the epigastrium, and on a gentle jerking push being made from right to left, the large and indurated spleen could be distinctly felt tilted almost as far as the mesial line. Its smooth and rounded edge was significant of the notable enlargement of the organ. This lady had for years complained of a depending dragging sensation in the left side, and she could not lie in comfort on the right side. Her greatest trouble, however, was the persistent uneasiness which she experienced immediately below the ensiform cartilage; pain after food, flatulent distension, and sour eructations had long been from time to time distressing symptoms. Occasionally these feelings were associated with nausea and vomiting. She was under my care for some months subsequently, when for a time she left Tunbridge Wells. Nearly two years afterwards I was again sent for to see this patient, who sought relief from her former malady. She had pain at the epigastrium, which was augmented on moderate pressure, and there was a continuous feeling of sickness. During the subsequent few days she received some alleviation from the treatment adopted. Again I was in great haste sent for, and, being from home, my friend, the late Dr. Milner Barry, attended instead of me. He found she had vomited a large quantity of blood, and he prescribed turpentine and iced drinks. On my return home three hours afterwards I saw the patient, when the hæmorrhage had not ceased. The turpentine was repeated, but the vomiting of blood returned. I then tried gallic acid, but not with any marked effect. An ice-bag was placed on the epigastrium. I then commenced with thirty-drop doses of the

tincture of the perchloride of iron, and, after the administration of this remedy, the bleeding began to decline. Very great prostration was induced, with approaching syncope. I remained in the house all the night, and the patient was doubtless in a very precarious condition. She vomited more than four pints of blood. For many hours the pulse was very small and compressible, the heart's impulse subdued, and the features became exceedingly blanched. During several days copious pitchy evacuations were passed, proving how great a quantity of blood had flowed down into the bowels. On subsequent examinations of the abdomen, the spleen by the hæmorrhage had been very manifestly lessened in volume. Three or four months passed over before this lady regained her wonted condition of strength. Her recovery was slow, and the pallor for a long time remained in a marked degree.

Of the examples recorded, five out of the six were in females; bearing out what has already been said of the very decided proclivity of that sex to the disease. Their ages ranged between twenty and forty; and all were of notably anæmic aspect, and had previously been out of health. The young woman Caroline T. looked less cachectic and presented a more normal appearance than any of the others. The second and third cases had lost flesh and looked somewhat emaciated, but the same remark could hardly be applied to the others. Thinness and wasting are by no means the invariable concomitants in this affection; indeed, it may obtain in those who are plump, fully furnished, and who do not give outward evidence of organic mischief. When, however, the ulcerated surfaces are extensive and the process has been long continued, the patient loses volume, is flabby, and exhibits declension of strength and change in the organism. It sometimes happens, however, that cases are presented in which the emaciation has gone on to an extreme degree, and in such examples we are inclined to suspect malignancy; the negative facts, such as the non-existence of palpable tumour, the clinical history, the age of the patient, with other particulars, will aid in the direction of diagnosis. There is, however, often very great difficulty in pointing out the diagnostic differences between this affection, that of cancer, and that of chronic gastric catarrh; and more especially when the vomiting and sickness have not been considerable, when there has been no hæmorrhage, and when emaciation does not obtain. Again, the same kind of uncertainty is felt in chlorotic young women who labour under dyspepsia, who are subject to cardialgia, whose uterine functions are irregular, and who complain of variously located neuralgic pains. The physician may, perhaps, in such perplexing instances be somewhat guided in his judgment by a strict observance of the *nocentia* or *juventia*. The continuous and careful employment of alkalies, if followed by benefit, would naturally indicate the probabilities as to the nature of the disease existent. In all the instances of this malady it will be found that the prominent subjective symptom is that of *pain*, which

is described under varying degrees of expression and differing figurative epithets. Sometimes we are told it is a constant, wearying, grinding, and sore pain, or a dull aching sense of uneasiness, which at intervals, and more especially after food, becomes increased; some speak of it as tearing or burning; and others use terms to signify its sudden, sharp, and stabbing character. In some examples the patient refers its seat to the entire epigastric region; but, according to my own experience, it is more frequently ascribed to a given and limited space, especially at the situation immediately below the ensiform cartilage. It is not uncommon for darting and lancinating stabs to be felt through, high up, as far as the interscapular space, or at the lowest dorsal and first lumbar vertebræ; and sometimes the pain radiates towards the hypochondria or umbilicus. In these cases all complained of pain after eating, and in particular at the circumscribed locality just named. The attacks of gastrodynia seemed to be not a little modified by the kinds of ingesta, and it will be found, as a rule, that rough and solid food most readily provokes suffering. There is generally, as the accompaniment, more or less of pyrosis; and not unfrequently, as in malignancy, the eructations are copious, persistent, and sour. The gastorrhœa will vary much, according to the kind of nutrients which are taken; in other words, correlatively with the stimulus or excitation given to the digestive surface. In passing, it may be observed that in some exceptional instances the introduction of food into the stomach for a time seems to arrest or mitigate the gnawing sensation experienced; but I think such very exceptional, and the contrary is quite the rule. In the great majority of examples there is greater or less immunity from pain when the organ is empty. In mere cardialgia and spasmodic attacks at the epigastrium pressure will often confer a kind of comfort, or at least not augment the suffering. In ulcerations of the gastric surface even slight manipulation gives rise to tenderness, and it sometimes happens that the localised soreness is so excessive that the least touch is instantly complained of, nothing tight can be worn round the waist, and sometimes even the mere weight of the bedclothes cannot be borne. In young, nervous, and sensitive women these kind of instances are, though with some rareness, observed; and still more exceptionally in such patients the pain may be so acute as to give rise to syncope or epileptoid seizures, and some writers have said that such events are most prone to supervene during the catamenial period. When the pain seems to come on with or immediately after a meal, emesis will not infrequently give sudden relief, and there may then be comparative comfort experienced for some hours. The organ then becomes relieved of its burden, its physiological action is not excited, and its quiescence does not provoke suffering. It must be held in mind that this symptom, pain, is not an infallible index to the extent and seriousness of the malady; because such symptom may have obtained in great or even

in distressing degree, and have been of long continuance, and recovery eventuate; and because in certain exceptional cases it may have been neither marked nor absolute—when a mere sore, dull uneasiness has been experienced,—and yet a sudden and fatal issue has eventuated. The intensity of the paroxysms, doubtless, depends mainly upon the greater or less invasion of the nerves in the course of the ulcer, just as hæmorrhage depends on the greater or less crossing of vascular branches at the seat of ulceration. The reader may here also be reminded that pain to some degree may remain as an irremediable and abiding result after healing and cicatrization have taken place. There may be left such puckering up of the gastric tunics as to markedly narrow the cavity of the organ at one particular part; and as these ulcers almost invariably elect the smaller curvature and the vicinity of the pyloric orifice, it is by no means impossible, and is indeed sometimes the fact, that permanent stricture is established, which is not only rendered a constant source of pain, but may also be such as to effect an amount of narrowing which so interferes with digestion and nutrition as to bring on gradual wasting and at length death; or the digestion may only be affected in a modified manner, and the greater end of the stomach, by the partial obstruction, may become unequally and unsymmetrically dilated, when a rounded fulness of contour is the outward and tangible effect at the epigastrium. Some sparse examples of what is now described are to be found recorded in the literature of this subject; and certain pathologists have named this kind of stricture as the hour-glass form of contraction. From what has now been said, it is evident that a right estimate is always to be made of this symptom, and its kind and quality to be considered as the aim in diagnosis. There is pain in gastric catarrh; but in gastric catarrh the feeling of discomfort and uneasiness is more diffused and not so acute. In mere cardialgic attacks attention to the ingesta will ere long point to the real nature of the ailment. In the obstruction consequent upon inspissated bile and gall-stones, the mode of accession, the concomitant conditions pointing to hepatic disorder, and the often sudden and final cessation of the suffering, will guide our decision. Again, other negative as well as positive facts will aid in the conduction to a correct inference. Ziemssen says it is often associated with tuberculosis and chronic pneumonia, and also that affections of the endocardium have been known simultaneously to occur; and Siebert refers the primary cause to derangement of the nerves proper to the stomach, whereby vascular circulation and the nutrition of the organ are in due order morbidly influenced.

In all these cases there were *sickness* and *vomiting*. In the young lady, the third example given, such obtained in a very aggravated degree, nor did any remedies prove of much avail. The suffering thus produced was very distressing. Towards the end of her illness the simplest and blandest nutrients could not be retained. This constant irritability of the organ, and at length its non-reten-

tion of food or liquids, ushered in the beginning of the end; emaciation and loss of strength became more and more marked, until vitality was, as I have said, slowly but gradually extinguished. Vomiting has, and correctly, been considered to stand next in frequency to pain. There are, however, as if to prove the rule, some very exceptional cases from time to time observed in which sickness hardly, or at all, comes on. So far as my own experience extends, I have never known one instance of this disease in which nausea or vomiting had been absent. The time after food at which the organ's ejection of its contents occurs differs. If the ulceration happen to be near the cardiac opening it is likely to come on quickly after the ingesta have been taken; if in proximity with the pyloric end, an interval of some time may intervene—that is, when the digestive process shall have progressed, and the contents begin to pass into the duodenum. It is worthy of note that in these few cases, where it is presumptive the ulcer is towards the cardiac end, there is a simple ulcer, absence of dysphagia, the œsophagus maintains its action, which is unlike that which occurs when there is malignancy at the cardiac orifice. A woman between thirty and forty years of age, who had most suspicious symptoms of carcinoma at the lower end of the œsophageal tube, came into the Hospital greatly emaciated; the sickness was immediate after the attempt to swallow food, and she complained of constant and deep-seated pain at the pit of the stomach. Mr. Cleland Lammiman, the house-surgeon, attempted the introduction of the tube of the stomach-pump, but the end would not pass into the stomach. He dexterously succeeded, however, in getting the end of a thinner bougie to pass beyond the stricture, and, in the course of time, such dilatation had been effected that a much larger tube passed into the cavity. She then took a tolerable amount of nourishment, and her appearance had greatly improved. But the prognosis in such cases renders ultimate recovery very doubtful; and I have here incidentally mentioned the case of this woman because sickness was a prominent symptom, yet the case was evidently not mere gastric ulcer. To resume from this digression. It is quite in accordance with physiological experiments and the observance of facts that ulceration of, or near one of, these outlets is more likely to give rise to this so-called anti-peristaltic action. The terminal filaments of the pneumogastric there receiving irritation and excessive stimulus, those wave-like contractions of the muscular walls of the digestive tube generally arise with more force; and through the sympathetic influence of the nervous system the associated movements of the abdominal muscles and the diaphragm come into play, and the organ is relieved of its contents. Hænoch has aptly observed that attention to this fact holds good with regard to other hollow organs; that reflex movements are prone to supervene when there is localised irritation near their openings, as when such is present at the neck of the bladder, or when tenesmus is produced by some disease in the rectum or at the anus. Vomiting

is a reflex function—the pneumogastric filaments being the efferent nerves, the medulla oblongata and cord the excitable centres—and becomes an excito-motor act by the kind of local stimulus which this disease confers. The ejected matters will, of course, in their character partake very much of the last kind of nourishment which has been taken, and will be influenced according to the time to which they have been subjected to the gastric secretions. They may consist of food slightly altered, of acid or neutral fluids, mixed more or less with mucus or blood, and the microscope not unfrequently detects epithelial scales, pieces of elastic fibres, or those parcel-like formations which Goodsir discovered and named *sarcina ventriculi*. In those instances of chronic ulcer of long standing, and in which sour eructations have been a persistent and troublesome symptom, the epithelium covering in the mouth becomes removed, and the tongue is rendered red, fleshy, and fissured, and with these conditions there is generally great thirst.

In four out of these six recorded examples *hæmorrhage* came on in most alarming degree, and in one, as it has been seen, was rapidly followed by a fatal issue. This event is so characteristic of ulceration in this cavity as by some to be regarded as a pathognomonic symptom; but it can hardly thus be considered, as blood from varying parts may pass out of the stomach when there is even no abrasion of the gastric lining; or it may be capillary exudation, and even profuse. The loss of blood from the ulceration now spoken of may be quite insignificant; it may be a mere exudation or in trifling amount from the crossing of the extreme vascular terminations in the submucous tissue, and under the control of the ordinary astringent remedies. Sometimes, as Cruvelhier and Frerichs have remarked, it may come on in active manner when the general venous system of the stomach is rendered hyperæmic and turgid, as it sometimes is from splenic and portal engorgement. And thus if there be obstruction of the liver or spleen simultaneous with this affection, the event of hæmorrhage becomes far more probable, and may be looked for in great excess, and when such organs are relieved of their turgor the gastrorrhagia subsides. It may be held in remembrance that in chlorosis there is increased friability of the vascular walls. When the ulcerative process happens to invade one of the larger trunks of the gastric arteries, very copious amounts of blood are then with much suddenness poured into the cavity of the viscus. The gastric, pancreatico-duodenal, coronariæ ventriculi, gastro-epiploica dextra, splenic, or hepatic arteries, or even the portal vein, may thus be opened. This contingency is generally such as to induce the final cessation of the heart's action. According to Murchison, when one of these branches is but minutely perforated, fatal hæmatemesis may ensue. And it has been shown by examination after death that the orifice from whence such a large outpour of the vital fluid issued was so minute as to be hardly discoverable. Of fifty-two fatal cases collected by Brinton, in twenty-four the ulcer

was seated at the smaller curvature, in seventeen in the posterior surface, in six at the pyloric end, and only in two on the outer surface. In the fifth case now given the place of perforation and fatal hæmorrhage was at this very exceptional situation, at the anterior surface of the larger curvature. Again, in certain of the more chronic cases, in which morbid union has eventuated between the ulcer and adjacent structures, as when it becomes attached to the left lobe of the liver, the pancreas, or omentum, rupture of the vessels proper to such structures may by the extension of this morbid process give way, each in the same termination. A full meal, coughing, vomiting, or straining at stool, may be followed by hæmorrhage. In the first of the above cases, when the hæmorrhage came on the lady described the sudden and peculiar feelings which she experienced as a sense of "coldness and fluttering at the pit of the stomach." She soon afterwards complained of being "chilly and faint," and in no great length of time sickness came on, and to her dismay she threw up a quantity of pure blood. Very similar descriptions were given of the first feelings of this event by the next patient. She had also a sensation of fluttering and fulness at the stomach. In the last recorded example the pulse, countenance, and general appearance of the patient gave indication each time when the blood began to be poured into the stomach, as soon afterwards more blood was vomited. This lady, prior to the return of ejection, by her peculiar feelings at the epigastrium, expressed a certainty of a recurrence of the vomiting. When such large losses of blood take place in the organ, more or less is always passed by stool. The evacuations for many days may present a tarry or pitchy appearance, and not unfrequently the dejections are rendered extremely offensive. The colour of the blood vomited is by no means of uniform appearance. Sometimes it is a light scarlet fluid, evidently showing its unmixed arterial quality; in other instances it becomes acted upon by the gastric secretions, or it may be by the medicines administered, and if it should for some time collect and lie in the cavity, it may be ejected in the form of a dark or grumous liquid or in black coagula. The presence of these coagula, as I have remarked, seems indicated by a sense of weight and oppression at the epigastrium. Sometimes they give rise to a feeling of coldness, and there is no doubt that more or less of the fluid thus removed from the circulation becomes digested. Lastly, in speaking of this symptom, when we have reason to regard the case as one of ulceration of the stomach, and when sudden prostration comes on, with pallor of the countenance, feebleness of the pulse, loss of heat at the surface, impaired vision, and tendency to syncope, it then becomes exceedingly presumptive that hæmorrhage has taken place, though no vomiting of blood reveals the fact; and in such instances the alvine evacuations should be carefully examined. It may here be observed, as a matter of great practical importance, that cases sometimes are seen in which, in the manner spoken of, there are great losses of

blood when hæmorrhage is not even suspected. The practitioner may be hastily sent for, most likely in the case of a cachectic and anæmic woman, or a pale and delicate-looking man, who is reported to have fainted, and on arrival there may be all the conditions of absolute syncope. It is related that such an one had for some time lost colour and been out of health, but complained of no pain, and had only been affected with weakness. There may have been no sickness, no vomiting, no epigastric uneasiness, nor any other localised suffering. We are told that giddiness, dimness of sight, and fainting came on without any apparent cause, and it may be that the same condition of things, within no great length of time, had occurred before. On subsequent examination of the thorax, the physical signs are natural, with the exception of a weak and over-exerted heart; no tumour, no tenderness, nor anything palpably abnormal, can be discerned in the abdomen. The cause of this unaccounted-for occurrence is vaguely and unsatisfactorily referred to general debility. In such instances we should always be suspicious of the loss of blood into the alimentary canal: the bleeding orifice may be within the gastric cavity, and yet no vomiting; or it may be from ulceration in the duodenum, the colon, or other part of the lining membrane of the intestines; and the solution of the difficulty often alone lies in examination of the stools, when melanotic evacuations tell the tale of the real cause of that which had been ambiguous and ill understood. I am quite sure that attacks of the kind spoken of more frequently occur than is generally supposed; and I repeat, in faintings and syncope thus spontaneously coming on, the evidence to be gained by the dejections should never be omitted.

The kind of ulcer now described is very rarely of the acute, but nearly always of the chronic form; and it is generally single; there may, however, be two or three, or even a greater number, but such instances are exceptional, and when there is a plurality of them they are generally situate near each other, most frequently at the posterior surface and at the pyloric end. Nor is it an uncommon thing to detect the cicatrices of similar and foregoing places of lesion; these indications may be a mere trifling loss of the villous coat or white lines; or there may have been such an amount of destruction of the mucous and muscular coats as to have left a puckering-up and an irregular folding of the walls, and when such places are viewed on the peritoneal aspect the serous membrane is to be observed crumpled and wrinkled, or in radiating or stellate lines. It is thus that in extreme instances of this kind of contraction the shape and contour of the organ may become very greatly or even fatally altered. The internal surfaces at some particular point may approximate, and only leave a tortuous and contracted passage, and thus the patient may finally sink from sheer inanition; and such event, it may be remarked, is nearly always at the pyloric portion of the stomach. Again, this resulting approximation of the parietes, by producing contraction of one part, is apt to render the

remainder of the organ sacculated or largely and unsymmetrically distended, and thus an abiding condition of discomfort and impaired health are the inevitable consequences. And with such changes, violent cardialgic pains are common accompaniments.

CAUSES.—The causes of gastric ulcer and the site which it elects have, and justly, been held in disputation by pathologists; nor is it to be wondered at that there should be a want of consentaneousness of opinion relative to those questions, because, as in many other problems arising out of the lesion of internal parts where neither ocular demonstration nor direct experiment can be brought to bear, as in the investigation of diseased structures where the morbid phenomena can be observed, such is necessarily left to vague hypotheses and individual ways of thinking. Some have asserted that the first cognisable change in the gastric surface is a slight and demarcated shrinking of the mucous coat, with more or less of vascularity in the subvillous tissue; and their descriptions have inclined to the notion that the initiative and fundamental alteration is of a congestive and inflammatory kind, whereby the nutrition would necessarily become affected. Such, however, rather belongs to those generally entertained doctrines which ascribed so much in the causation of most diseases to an origin of inflammation; but these views, with a profounder, a more exact, and demonstrable pathology, are now considered untenable. Virchow regards the first condition in the process of this affection as an arrestment in the circulation through such a sufficient depth of the gastric tissues as to allow the destructive power of the gastric juice to be exerted on such part, when the blood is there deprived of its naturally opposing quality—that is, its normal alkalinity; and, in confirmation of this notion, ligature and embolism of the gastric arteries have shown that under such obstructive circumstances the solvent action of the gastric juice will dissolve not only dead portions of the stomach wall, but also parts which are not necrosed but whose vitality is lowered. In favour of this theory it has also been remarked that these ulcers are more liable to be located in that part of the digestive canal which lies above the reach of the alkaline bile. It has before been insisted upon that the ailment now considered is most liable to occur in the chlorotic and cachectic, in whom there is blood-lesion, and consequently a lowered vitality, as more particularly taking place when there are derangements of nutrition during puberty; and hence it is doubtless a localised effect of the want of normal vitalism in an organ in which the nerves proper to such part are implicated, and thus the degraded change spoken of, which renders the otherwise resistive tissue a prey to the gastric acid. As Wilks and Moxon remark, the cause of this ulceration may be somewhat analogous to the cause of ulceration of the cornea, which comes on in a debased state of the system and a general lowering of its vitality. We know, as already observed, that embolism in the liver, spleen, brain, and other organs is followed by circumscribed decay; and, by a parity of

reasoning, embolia in the arteries of the stomach may be followed by a like phenomenon. It has, however, been pointed out, in opposition to this theory, that in many cases of broadly diffused embolism of other organs embolism of the stomach has not been found. Virchow, however, believes embolism to be the most frequent cause; and he also thinks that obstruction in the portal veins, fatty degeneration of the arteries, and mechanical injury sustained by the vessels in vomiting, are prominently to be enumerated. And thrombosis and the atheromatous and amyloid changes may doubtless be added as primary and remote causes. This high authority also comments on the fact that the configuration and position of these ulcers incline to the notion of their being primarily of arterial origin, and that their conical form resembles what occurs in embolism in other parts.

PATHOLOGY.—All authorities agree that gastric ulcer is most frequently found at the posterior surface of the organ, and next in frequency of its site is the lesser curvature and at or near the pylorus, for which it seems to have a sort of elective affinity. As already remarked, it is very seldom observed on the interior surface, the greater curvature, or the cardiac end. Some have endeavoured to account for this election of the pyloric portion and smaller curvature by the greater fixity of the organ at this part, and thus its increased liability to irritation; but such would hardly explain the peculiarity. We know that carcinoma is far more prone to appear at certain parts of the alimentary canal than in other portions of its course, and that in the vast majority of instances it is detected either at the pylorus, the ileo-cæcal valve, the sigmoid flexure, or the rectum, and that the intervening spaces possess comparatively an immunity. In other organs and tissues we know there is a kind of preferential caprice in their lesions which is difficult of explanation. It is, perhaps, much dependent upon vaso-motor influence. The diameter of these ulcers varies from a quarter of an inch, it is said by some, to the extent of a space equal to the palm of the hand. From my own experience I should say they are by far most commonly noticed from the size of a fourpenny-piece to that of a half-crown, and, when larger, very probably two or three have coalesced. They are mostly round or ovoid, and only sometimes of irregular outline, and when noticed from the inner surface they have a punched or stamped appearance, the outer edges being smooth, clearly defined, and as if vertically cut. Within they are funnel-shaped, the cone pointing towards the serous membrane, and if more minutely examined when they have become chronic and when absorption has taken place, their interior often exhibits, as I have already said, a kind of crater-like or terrace formation. The margins may be greyish, pale-red, or brown, and sometimes small dark coagula are adherent to their borders. The edges, as a rule, are well defined, and there the submucous tissues may be rendered thick, harder than normal, and more or less elevated above the surrounding

surface. The ulcerative process is sometimes discovered to have so far progressed as to have extended fully down to the serous covering, when the thin peritoneal coat alone maintains the integrity of the organ, and thus life is imperilled by the occurrence of some trifling or fortuitous circumstance, whereby a rent in this attenuated tissue might be effected, such as a slight blow, a full meal, or straining at stool. When the serous coat thus gives way, as in the instance recorded, the opening looks like a clean-punched hole without any fringing or lapping at the edges. Sometimes the peritoneum, after having been denuded of its coverings from within—a condition which first takes place in the centre of the cone,—becomes vascular, opalescent, and at length a yellow slough is formed, which either partially separates spontaneously, or is partly or entirely displaced by some extra exertion, sudden distension, or slight mechanical force in some other way applied, and thus perforation is effected. When the ulceration is on the posterior aspect of the stomach, and the peritoneum becomes irritated, lymph is thrown out on the free surface of the membrane, and agglutination with some neighbouring organ or structure may eventuate, as to the left lobe of the liver, the pancreas, the omentum, spleen, or certain lymphatic glands. And the result of this may be, and not very unfrequently is, conservative, by preventing the extrusion of the contents of the stomach into the great serous sac, and thus ushering in a fatal catastrophe. The fibro-cellular formation in the course of time may impart a thickness to the organ to which such union has taken place, and such organ be in no otherwise affected. But pathological changes of a different kind may eventuate. This union having come to pass, circumscribed peritonitis is the consequence, and the partially inflamed peritoneum is rendered over a greater or less area vascular, tumid, and adherent. It may give rise to inflammation of the diaphragmatic pleura, and thus symmetrical pleurapneumonia may be established at both bases, and all the ordinary phenomena of the physical signs be rendered present. The morbid coalescence to internal parts spoken of may be only temporary, as the neoplastic connective tissue may after a time give way; it may become soft, absorbed, and lack the power of organisation, and thus rupture has only been for a time warded off, and not permanently prevented. The effused product, however, may assume the characteristics of a fibro-cartilaginous substance when the blocking up of the breach of continuity is effectually secured. It is a curious pathological sequence, and one which has been commented upon, that in this disease, when the ulceration has extended through the serous membrane, it takes on a suppurative tendency, when the matter may burrow through the diaphragm into the thoracic cavity, where it has been known to be followed by a gangrenous condition of the pulmonary substance; or it may, in seeking an outlet, penetrate some part of the intestinal tube, or pass through the abdominal wall, and thus establish gastric fistula. It is possible that diffuse

and flagrant peritonitis may be set up, when the intestines and solid organs have been found matted together, and the entire serous membrane revealing all the usual conditions of its ordinary inflammation. Such, however, in these cases is exceptional, because the blood is not such as to readily give off the commonly seen effusive products, and because such inflammatory phenomena as take place are of the asthenic type.

Perforation is much more likely to occur when the ulcer is on the anterior aspect of the stomach, as in the case narrated. When there situate there is less chance of adhesion, as the mobility of the diaphragm and the abdominal walls opposes this kind of union, and its occurrence in this position is necessarily fatal. The cause of death in such event may be from the sudden shock which the system sustains by an outpour of ingesta and gastric fluids into this great cavity; or the place of opening may happen to lacerate one or more arterial branches, and the hæmorrhage to be such as at once to destroy; or diffuse peritonitis, as before remarked, may be instituted. In the eruption of such an amount of extraneous products, the great splanchnic nerves, and the cardiac plexus in especial, may become so gravely impressed and subdued as speedily to arrest the heart's action; and more likely would such be the case in a patient who had long suffered from this disease, and who was perhaps debilitated by previous losses of blood. Again, in such an instance the hæmorrhage is favoured by the already existent blood lesion, and that defibrinated state to which the vital fluid has been reduced, and thus a less outpour may be fatal than in other cases in which hæmatemesis is produced from other causes. It may not inaptly here be remarked, when there is solution of continuity of the peritoneal covering of the stomach in cancer the process is slow, most rarely sudden, and very exceptionally so as to allow of the extrusion of the contents of the organ. In malignancy the growth may destroy the diaphanous investment, but this destruction is a gradual process, and the effused product solders up an orifice which would otherwise be fatal.

DIAGNOSIS.—In saying a word on the *diagnosis*, it can hardly be contested that there is, and not infrequently, not a little difficulty in coming to a decision as to whether this complaint be or be not present. In a large number of diseases with which the physician has to deal there are certain cognisable, significant, and well-understood conditions, which, when thrown into the scale of evidence, leave no doubt on the mind as to the nature of the malady. In this affection it often happens that such precise and absolute conclusions are not to be arrived at. As regards the ailments incident to the three great cavities, something of hesitation and doubt must always qualify our opinions. And as pertains to ulcer of the stomach these observations are particularly applicable, because its prominent and distinguishing symptoms are, each and all, the leading symptoms of other forms of disease; because none can be strictly regarded as

pathognomonic; and because one or more of what are deemed cardinal symptoms by which it is more commonly recognised may be but slightly pronounced or entirely wanting. In illustration of what is now maintained, to take the symptom *pain*: it may be felt, and in a very characteristic manner, at the place where it is very generally experienced in gastric ulcer, and yet be dependent upon other causes; it may be there from simple irritation of the lining membrane when there is even no abrasion of the gastric surface; it may be from mere offending ingesta; it may come and go with intervals of freedom, precisely as we know such to be the case in this ulceration, and be only gastralgia. Chronic gastritis with gastrorrhœa will produce pain at the ensiform space; obstruction or narrowing of the biliary ducts, and aneurism and other deep-seated tumours, sometimes give rise to epigastric pain, which may come on paroxysmally and bear much similarity to the pain caused by the disease now considered. Again, in that form of cancer which is spread over the gastric membrane, which is called *cancer en nappe*, and which cannot by palpation be discovered, there may be epigastric pain; and also in malignancy at the pylorus, when the tumour cannot be felt, as is sometimes the case, pain may be there experienced. Pain, then, is insufficient for diagnosis. A good deal of the same kind of reasoning might be observed with regard to *sickness* and *vomiting*, which are the symptoms and effects of various other causes than gastric ulcer. They may be from ingesta or irritants carried into the organ, as in cardialgia; from gastritis; and from malignancy. Violent neuralgia will give rise to sickness and vomiting. In cancer, these symptoms may come on after longer or shorter intervals, just as in simple ulcer. In both affections they may not, from first to last, be very marked nor yet very recurrent. Neither the frequency of the ejections nor the matter ejected will alone suffice to be our guide. In a simple ulcer, as in cancer, the contents may in varying degree be mixed with blood; and in both affections there may be that kind of œsophageal regurgitation which indicates the presence of organic disease. And, once more, to speak in this manner of *hæmatemesis*, which, although a very constant symptom of gastric ulcer, is not in every case present. Again, vomiting of blood may be produced by a variety of causes in addition to that of ulceration. Blood sometimes comes from the stomach, as if vicariously, on the cessation of hæmorrhoids and during the irregularities of the catamenia; and we also know that, under other and less understood conditions of the system, blood may proceed from the gastric membrane in those of hæmorrhagic tendency, just as epistaxis may supervene on puberty or adolescence. In acute gastritis there may be bleeding from this source; and in splenic and portal congestion sanguineous fluid, and sometimes to a large extent, may be regurgitated into this cavity and ejected. And in cancer of the stomach periodic losses of blood, more especially when this disease has made considerable progress,

are by no means uncommon. In this affection, when it assumes a slowly advancing and an insidious form, and when the tumour is small or may not at all be recognised, losses of blood may come on, and considerable intervals intervene, without much emaciation, and this may closely resemble gastric ulcer. The best rules for our guidance will be a general review of all the positive as well as negative facts. When, on careful examination, no tumour can be felt in the pyloric region; if there be alternations in the pain; if food seem to bring it on, and there be repugnance to food because it gives discomfort; and if there be, more especially in pale and anæmic women, a craving and capricious appetite, and the epigastric uneasiness continue so long as the digestion is carried on; if the pain dart up behind the sternum and through to the back or into the hypochondria, and is increased on moderate pressure over the stomach; if there be vomiting of blood, which may also be of the coffee-grounds character or black vomit; if there be occasionally melanotic stools; and if there be general wasting and loss of strength,—such indications are exceedingly presumptive of ulceration. In cancer, the tumour can, as a rule, be felt: if at the pylorus, it can mostly be discovered near, or as if passing under, the right costal edge; and if at the cardiac end, the situation of the enlargement will vary with the emptiness or fulness of the stomach. In cancer, the wasting and cachexia are more marked, and the features will sometimes assume the aspect of old, whitish, yellowish wax; and the clinical history, sex, and age of the patient would in some measure modify our opinion. In ulcer of the stomach, there may not be much loss of flesh; and, as before remarked, the tongue sometimes looks preternaturally red and clean, and there is much thirst.

TREATMENT.—Making, in conclusion, a few general remarks pertaining to the *treatment* of this affection, it is needful with emphasis to insist that the strict observance of rest and quiet is a consideration which should precede the adoption of all other rules and remedies; and by these terms should be implied the physiological rest of the organ, as well as the abstention from all unnecessary activity of the voluntary muscular system. That movement to which the stomach is stimulated in the process of digestion should be kept as subdued and passive as possible, in order that reparation may be carried on in the part or parts of lesion, or, in other words, that cicatrisation may be formed. The active motion and the distension of the organ must of necessity tear apart new bonds of union, and hence those granular formations which in their reparative efforts are effecting the healing up of the sore, are broken down or swept away, and the ulcerative surface continues, precisely as when the same morbid action obtains in other and more apparent parts of the body, and when motion prevents the cohesion of or growing up of surfaces. The strength of the system in general should be conserved as much as possible, and tissue-waste reduced to a minimum. In briefly

enumerating the most important of the therapeutic agents, opium and the nitrate of silver, which may be given separately or together in a pill, doubtless in many cases are followed by much benefit. The powder or extract of opium may be given, or the acetate or hydrochlorate of morphia in small doses, and continued at regular intervals, whereby the functional activity of the organ becomes lessened. The hypodermic administration of morphia sometimes avails. The nitrate of silver doubtless acts in a manner similar to its ordinary effects when applied to more tangible and obvious places of ulceration. Indian hemp and the compound kino powder have by some been employed with success. Alum, tannic acid, and the acetate of lead are often serviceable. The subnitrate of bismuth I believe to be a valuable remedy in this affection; it should be ordered with mucilage, and as the patient progresses it may be combined with some bitter infusion, as those of calumba and gentian. While there is much pain, fomentations, cataplasms, sinapisms, turpentine stupes, and the external application of opium generally give ease, in addition to internal remedies. Perfect quiet and the horizontal position, with warm clothing and coverings, should at the same time be enjoined. The stomach may be kept warm with flannels and lint. When there is much sickness the carbonates of soda and potash with hydrocyanic acid I have generally found of service, or not infrequently a large opiate will allay this symptom. Ice may then be given. In hæmorrhage the most efficacious medicines are rhatany, sulphuric acid, gallic acid, turpentine, and the tincture of the perchloride of iron. In many cases the gallic acid is much to be depended upon, or if it should fail, half-drachm doses of the tincture of perchloride of iron may, during great urgency, be given in iced water every two or three hours; and I have sometimes known a large opiate succeed. I have been informed, but cannot speak from experience, that in such attacks of hæmorrhage as are uninfluenced by the more commonly employed agents large and repeated doses of neat brandy are not unlikely to be followed by its arrestment. When the loss of blood has been alarming, I have not hesitated to try a gutta-percha bag of ice applied to the epigastrium. In such cases, however, where there is extreme exsanguination, where the cardiac impulse is weak and fluttering and the pulse quick and feeble, with perhaps a syncopal tendency, caution in the mode of using cold is needed, for, if this were employed continuously and in excessive manner, its sedative effect might be such as to gravely subdue the heart's action. There are not, however, those objections to this way of applying ice which there are in hæmoptysis, and in cases of imminent peril it should be tried. Warm applications ought at the same time to be made to the feet and legs. In the event of that terrible occurrence, perforation, though we then feel that little or nothing can be done to avert the fatal issue, yet, as there is generally excessive pain, our endeavours should be exerted to mitigate suffering. A large bran

poultice, which is not so heavy as linseed meal, may be placed on the abdomen; and the best mode of doing this is to put the bran into a flannel bag, and a teaspoonful of laudanum should be sprinkled upon it; and if a large piece of oil-silk or gutta-percha sheeting be carried fully beyond its edges it will keep warm much longer than otherwise, and thus save the patient from the discomfort of so much changing. Full doses of opium should at the same time be administered internally, if only with a view to an euthanasia. Such is the best and really the only efficacious method to give relief for the few hours which then life lasts. In all instances of gastric ulcer, it is a matter of importance that the bowels be kept in gentle but regular order, and the gastric membrane should be spared as much as possible, and any medicines which might irritate or induce sickness should be sedulously avoided. Enemata are the safest, and these may be merely of gruel or warm water, or, if needful, oil may be added. In many instances, more especially in cases of long standing, and those in which there has been hæmorrhage, some preparation of iron is needed, which may be conveniently combined with some bitter infusion; and if the heart's action be excited and irritable, digitalis may be conjoined with these.

Our therapeutic endeavours can only be successfully pursued by keeping in view those fundamental and pathologic changes which essentially signalise and mark the course of this complaint. From the want of certitude which there is in the initiatory stages of the malady, and the analogy which subsists between the earlier cognisable symptoms and the symptoms incident to other forms of disease, prophylactic means can seldom be observed. When chlorosis and anæmia are the concomitants, to improve the blood, to alter and remove these conditions, and favour the process of general and normal nutrition, should be our aim; and not only should medicinal agents be judiciously administered, but dietetic rules should be very stringently enforced. To arrest the fermentative process of retained ingesta, to neutralise abnormal gastric acids, and to stay the solvent and peptic influence of such acids where necrotic changes have taken place, and where new granulations are forming, should be the intention of our remedies. The acids of the stomach should be fully neutralised at least once in twenty-four hours, and every day the contents of the organ should be emptied into the intestines. Such regular and systematic urging forward of the acid chyme would favour the conditions of granular reparation, and give a better chance of the ulcer healing. An aqueous solution of the carbonate of soda well answers the purpose, and this should be taken when the stomach is free from food, and when the saline is likely to come in fuller contact with all parts of the gastric surface. Ziemssen, Jaksch, Oppolzer, and Niemeyer recommend the Karlsbad waters or the Karlsbad salts, which can be artificially made. The spring to which they give the preference is the Sprudel, which analysis has shown to contain the sulphates of soda and potash, the chloride of

sodium, and carbonate of lime, with small quantities of carbonate of soda, carbonate of iron, phosphate of alumina and silica. These authorities consider the Glauber salt as by far the most important agent in ulcer of the stomach. The first-named of the above-cited writers thus speaks in reference to this point: —“Glauber’s salt is, according to my experience, the alkali which must be regarded as the most important in the therapeutical treatment of ulcer of the stomach, not only because it acts promptly and certainly in evacuating the contents of the stomach into the intestines, but because it at the same time positively checks or prevents the acid fermentation of those contents. In both respects the effect of common salt is similar to that of Glauber’s salt, since it also has the property of restraining the fermentation and putrefaction, and at the same time exerts a gently stimulating effect upon the muscular coat of the stomach and intestines. The latter effect is, however, much weaker than that produced by Glauber’s salt, and, in the majority of individuals, quite insufficient.” The sulphate of soda, carbonate of soda, and common salt are considered as the most active ingredients in these waters, and the artificial Karlsbad salts can conveniently and efficiently be prescribed when the patient cannot be sent to the springs. It is the opinion of the more recent writers on pathology that in gastric ulcer the ingesta are unduly retained in the viscus, and that the same slowness of the organ in passing forwards its contents obtains in gastric catarrh, and with gastric catarrh there is, as the rule, intense acidity. Under this perversion of peristaltic and secernent function, the hydro-carbonates, such as fat, saccharine compounds, rich pastry, beer, and other articles of food, readily produce the butyric, lactic, and acetic acids, which favour fermentation, arrest digestion, and give opportunity to solvent and peptic effects on the new granulations at the floor of the ulcer, which has become denuded of its epithelial covering, and, consequently, is more liable to be injuriously operated upon by abnormal agents. And if these views be true, the use of these remedies can at once be comprehended.

With regard to food, it should be given at short intervals, and protracted periods of fasting should always be carefully avoided. With long intervals of abstention from nourishment there is the risk of too much being taken at one time. A patient labouring under this disease ought to have something between bed-time and breakfast-time; and in more marked cases sustenance should be taken every three or four hours during the night as well as the day. Those light articles of diet should be given which are deemed the most nourishing and easily digested, and which are least likely to give rise to acidity and flatulence. And it is well to observe that the patient ought to keep as much as possible in the recumbent position. All such aliments as may be considered saccharine are to be interdicted, and it is scarcely needful to notice that solids should be strictly forbidden. A single meal of indigestible food might undo

the progress made towards amendment of weeks or months, or cause the fatal accident perforation. Those who have seen most of this disease cannot do otherwise than concur in the opinion that rest and diet, rightly directed, are almost of more consideration than the kind of drugs to be prescribed. Several years ago I was much impressed with the truthfulness of this assertion. I then saw with the late Mr. Bishop of Tonbridge a young lady who had evidently long laboured under gastric ulceration. She had lost flesh and strength, and the stomach had become so intensely irritable that almost everything she took was at once ejected. The most bland and simple forms of nourishment could not be retained, and various medicines had had a full trial. It was decided that one tablespoonful of new milk and one tablespoonful of concentrated beef-tea should be given alternately every half hour. This small quantity of each was retained, the irritability of the organ gradually subsided, and the patient at length made a full recovery. Good milk is one of the best articles of diet which in this disease can be recommended. It does not sometimes agree, but often because too much is taken at one time. It may be mixed with a little cornflour, arrowroot, or biscuit-powder. In other instances it may be drunk with the addition of lime-water or Carrara-water. Various animal broths and soups, without vegetables, may be ordered, as good beef-tea, Liebig's meat-extract, and veal and ham and chicken broths. Jellies can also be given with advantage. Trommer's malt extract has by some been found of service. It is scarcely necessary to observe that broths and soups should never be taken hot, and ordinary tea and coffee had better be discontinued. When there is the hæmorrhagic tendency, all descriptions of drink and nourishment should be given cold or iced, and the observance of this rule I generally request for three or four days after the last appearance of blood. In the course of time, when there is evident declension of the more prominent symptoms, the amount of food may be cautiously increased, and the intervals of taking it may be lengthened. Then lightly-boiled eggs, thin toasted bread, well-boiled maccaroni, and farinaceous puddings may be ventured upon, or the patient should be impressed with the great necessity which there is for slow and perfect mastication. In regard to stimulants, small quantities of brandy and cold water, or a tablespoonful of whisky and cold water, may be allowed, or moderate amounts of sherry, marsala, burgundy, or claret, and these wines are quite preferable to effervescent and sparkling wines and bottled beer. When such a recommendation can, without inconvenience, be carried out, change of air and climate, by giving a healthy impulse to the system and re-establishing the general powers of the constitution, is most important for adoption, and it is worthy of mention to the patient that the waters of Karlsbad, Marienbad, and Tarasper are on the Continent held in considerable repute for their curative properties in this complaint.

I may here give one more and marked example of this disease.

which had doubtless for a long period, and in occult manner, subsisted, and which, as in exceptional cases, ended fatally.

Mr. Sydney Austin, of Lingfield, Surrey, some time ago came to confer with me under unfortunate domestic circumstances. He told me that about a year ago one of his maid-servants, who had been in the habit of taking the chloral hydrate, took too large a dose, and died; and that another maid-servant, who had been in his service only about three weeks, became suddenly ill, after taking some medicine given to her by his assistant, and sank in the course of a few hours. On more of the details as to symptoms and circumstances being related, I gave it as my opinion that the last-named fatal issue had been caused by rupture of the stomach and diffused peritonitis. At Mr. Austin's request, I went to Lingfield three days afterwards, for the purpose of being present at the inspection. The following facts were reported relative to the deceased's history, and those conditions which marked her case before death. She was single, aged twenty-three, well nourished, and rather inclined to be fat. She had never during her life had any serious malady, but for many years she had complained of indigestion. Nine years previously she had to "keep her bed for bad digestion." Since that attack she had declared she had never been quite free from pains at the stomach. The lady with whom she had previously lived for eight years considered her delicate. For some time before her death she could not drink even cold water without producing epigastric uneasiness. Mr. Austin's advice being sought previously, he advised the relinquishment of her situation, as she looked thin and ill. She complied with this opinion, and remained at home five months, at the expiration of which time, "she had gained flesh, and looked quite well." She entered the service of Mr. Austin, and up to within "twenty-four hours of her death was in full work." She had, however, complained to her new fellow-servants that she "suffered pain after taking food." One morning after she had taken her breakfast the pains returned somewhat sharply at the epigastrium. She asked Dr. Miller (the assistant of Mr. Austin) if he would give her some medicine to relieve her suffering. This gentleman complied with the young woman's request, and gave her a bismuth mixture. After taking the first dose, the pain became intensified, rather than mitigated. The suffering in the abdomen was subsequently continuous. She was put to bed, and abdominal symptoms of formidable character set in. Opiates and other remedies were given, and fomentations, poultices, and terebinthinate epithems were assiduously employed, but with little or only transient relief. She lay on her back, with the knees slightly elevated; and the pulse, temperature, tympanites, and facial appearance told but too truly the tale of acute peritonitis. There was, too, general tenderness on pressure, and the breathing became thoracic. At length the pulse became quicker and declined in power, the respiration more hurried, and the extremities cool, and

she gradually sank, the mind remaining clear to the close. Two deaths having occurred with such rapidity and within so short an interval of time in one establishment were, under the circumstances, exceedingly unfortunate, and Mr. Austin very naturally wished that a careful post mortem examination should be made in the instance of this young woman.

The autopsy was performed by Dr. Miller about seventy hours after death. The body was plump and unattenuated, nor were there any indications of decomposition. On a free incision being carried down the mesial line from the ensiform cartilage to the pubis, a subcutaneous stratum of fat, from an inch and a half to two inches in thickness, interposed between the skin and the abdominal muscles. On opening the cavity of the abdomen, the conditions of recent and diffuse inflammation were abundantly presented. The vessels proper to the omentum were large and injected. The intestines were of pinkish hue, and at certain places the increased vascularity conferred the condition of patches of redness. On more minute inspection, deposits of recent and readily torn lymph soldered together the opposing coils of the bowels, but the effused coagulable material was altogether inconsiderable, nor were there discovered any of those floating semi-organised depositions which are so common and characteristic where the disease has been of several days' standing. At some points there was a besmearing of a sero-purulent product, but this was comparatively of small amount. There was also effused from two to three pints of a grumous, sero-sanguineous fluid, which was of a brownish, dirty-red, brickdust-like colour, but it was not mixed with coagula. The convex surface of the liver revealed the evidence of its serous covering having been inflamed. On the endeavour being made to take out the liver, and on raising the left lobe, a small quantity of purulent matter immediately escaped; and on a fuller inspection of the organ, a patch, of about the size of a shilling, denuded of the serous covering and exposing the dark parenchyma, was revealed. This round, brownish-red spot was encircled by a thickened ulcerative condition of the peritoneum, which seemed of old standing, as it was then rendered dense and opaque. On looking at the other viscera which still remained *in situ*, a round hole, nearly the size of a shilling, was noticed at the lesser curvature of the stomach and precisely where it would be in apposition with the localised hepatic lesion now described. The stomach was carefully removed. The circular opening, as seen on the peritoneal aspect, was not that clean-cut or punched outlet which is beheld when perforation eventuates without adhesions; but the entire edge was round and tumid or slightly elevated, as if a ring of organised product had been formed. The serous covering was not normally diaphanous in the immediate vicinity of the opening. On inspecting the ulcer internally it was seen to be funnel-formed or crater-shaped, and the unequal absorption of the inner coats had conferred the characteristic tumid elevations.

Surrounding the circle the stomach-wall was considerably thickened for at least a couple of inches, and this abnormal augmentation of substance gradually became less proclaimed, without any line of demarcation, until the natural parietes were again seen. On placing the thickened part between the fingers it felt dense, but somewhat elastic, and by no means so hard and resistive as the feeling of scirrhus when it affects this organ. The gastric inner surface in other parts seemed healthy. Lastly may be mentioned another characteristic condition which is but rarely seen in chronic gastric ulcer. When the organ was spread out on the table the hour-glass contraction was exceedingly well marked. The constriction was immediately under the ulcer, and thus the organ was divided, as it were, into two almost equally capacious, sacculated, pouch-like cavities, which curiously altered the normal configuration of the stomach. There was not much puckering up, nor yet many radiating lines from the aperture; hence it was presumptive that this central narrowing had been a long process and very gradually supervened.

From the particulars narrated of this illustrative example of chronic ulcer of the stomach, there are certain facts of interest to which a brief reference may be made. From the young woman's previous statements, and from what could be gathered from others, it was exceedingly probable that structural disease of the gastric membrane had been existent for several years. For a long period she had never been absolutely free from uneasiness at the epigastrium, and this was increased on taking food; the ingesta would cause irritation by coming in contact with the part of lesion, and its continuance showed the difference between such causes and that which gives rise to mere functional neuralgic or spasmodic suffering. Notwithstanding that half a year before she had become somewhat emaciated, the rest and quiet, the medical treatment and carefully regulated diet, sufficed to restore her normal volume of flesh and to render her in apparently good health. It is of significance to remark that the evident and acuter symptoms of rupture came on immediately after a meal, and it is probable that the dose of medicine which she took to relieve her pain passed at once into the peritoneal cavity with some of the other extruded contents of the stomach. The morbid phenomena set up by the event of perforation were very typical of that violent and fatal form of peritonitis which comes on when the serous membrane is thus torn, when sudden irritation is instituted in the sac, or when the cause is of traumatic origin. From the grumous sanguino-serous fluid there had evidently been a good deal of blood effused, consequent on the laceration at the part of lesion; and it will be remembered that in these cases, as I have pointed out, very considerable and even fatal losses of blood will follow the division of an exceedingly small arterial branch. It is not unlikely, from the clinical history of this patient, as well as from the appearances revealed on dissection, that this ulcer had existed for a very long time—it may be that it had been formed even some

years, because we have reason to believe that chronic ulcer of the stomach may go on very much longer than was once supposed, and more especially when the base of adhesion is formed by one of the solid visceral organs, and because the kind of hour-glass contraction which had eventuated must have been an exceedingly slow result. Again, the greatly-thickened parietes which surrounded the opening had manifestly been of long continuance. With a base so firm as the hepatic substance, there seems no reason why such an instance of adhesions might not become organised, and thus effect a permanent security against gastric rupture. And, indeed, we know that in certain instances which have been discovered where the patient has died from other causes, this mode of accretion to a neighbouring organ may be protective from worse results, and, in fact, conservative of life.

XV.

CARCINOMA OF THE STOMACH.

TUMOURS and chronic ulcers of the stomach were recognized by the earliest writers on medicine, nor is it strange that they should have received special attention on the part of the ancients, seeing, as they doubtless did, that they so frequently are followed by a fatal termination. The signs and phenomena which are the precursors and accompaniments of these conditions were then but vaguely and little understood, and their presence would then, as now, only too often prove the futility of remedies to arrest their course. The precision and certitude of our knowledge pertaining to the diseases of this organ it is here hardly needful to observe are of recent date, and more particularly to the time when pathological anatomy and the microscopic examination of diseased structures began to be commonly pursued is this advancement to be referred. Again, the present kind of clinical teaching, the exactitude which is now arrived at on diagnosis and nosological arrangement, and the more rational and better directed treatment, have all tended, in this as in many other complaints, to elucidate much which in former times remained dubious and obscure.

The malignant products found in the stomach-wall are only sometimes discovered in that separateness of their characteristics which is recorded in books and spoken of by teachers; there is a proneness to a mixing up of the varying carcinomatous qualities, and it frequently happens that inspection reveals two or three kinds of the anomalous substances in one deposition; and it may be held as a general rule, that the softer the cancerous mass, the more quickly it destroys; and the converse equally obtains, as its hardness implies more extended life. And there may perhaps be considered some sort of analogy between scirrhus and the earlier state of tubercle, and between encephaloma and that disintegrative process which marks the breaking-up of tuberculous products. The soft and resistless deposits seem to indicate greater activity of morbid change. The duration of life is evidently influenced, however, in more obvious and cognizable manner than by those latent tendencies, whatever they may be, which determine the consistence of the products in a mechanical manner, and by the fortuitous location of these respective deposits. When the inlet and outlet of the stomach remain

patulous, the entire system is less affected; if, however, one or the other orifice become constricted, a general and deleterious impression is soon rendered apparent. From instances which have come before my own observation, as well as from the recorded experience of others, there is no doubt that the scirrhus form, when the orifices are left patulous, may subsist for a very long time, even many years, without the health being very seriously affected, or at least with the maintenance of a tolerable amount of comfort. In certain of such cases, careful manipulation can occasionally detect some part of the parietes of the organ which has become thick and indurated, when the patient may have been considered as merely having chronic indigestion, the symptoms of which from time to time being more pronounced, and especially after indiscretion in diet; and there is in such examples generally more or less of anæmia and the cachectic expression. Again, in the protracted instances now particularly considered, the morbid formation may be constituted of a blending of malignant with non-malignant products. The sarcomatous or myosarcomatous tumours may be present in this organ, and in both of these adventitious substances nucleated fibres and spindle-shaped cells may be associated with depositions which are not avowedly carcinomatous. Hence from these facts it can be well understood that there may be thickening and hardness of the stomach-walls for a long time until some general and disturbing cause obtain in the system to favour and more fully develop the malignant tendency. Some incidental circumstance, such as the supervention of an attack of acute disease and its consequent debility; some mental fret or worry, with the loss of rest and the impairment of the nutritive and assimilative processes, or like cause, whereby the normal power of vitalism becomes reduced, would with such a proclivity be sufficient to develop the cancerous growth. And from what we know pertaining to the kind of disease now considered, it is exceedingly presumptive that these latent proclivities, when not awakened into activity by some excitant condition, may for long periods lie in abeyance, or even never come into progressive existence.

There is no doubt it not unfrequently happens that a proneness to malignancy only becomes apparent after other and preceding constitutional changes; these changes, however, being of such occult nature as to evade our present powers of detection; and it may be that such hidden mutations pervading the economy, and in more localized character, may not be materially inconsistent with health. Whether these incognizable alterations, or deviations from the normal functions of the body, primarily commence in the blood, the veins, or lymphatic systems, or in all these coetaneously, it is impossible to say, but they doubtless in one or all of these have their fundamental origin. The declension of strength and power are amongst the earliest indications of these inscrutable abnormities, whatever they may be; and debility or languor marks the progress of their insidious development. We are apt to speak in the undefined and ambiguous

language of a constitutional tendency to cancer, just as of a constitutional tendency to scrofula, tuberculosis, rachitis, gout, or the lithic-acid diathesis; and from the facts gained by more careful clinical history, as it is now the custom, it can hardly be denied that a heritable influence must be admitted as a cause in the first mentioned, though such cause may not be so obvious, nor yet so frequently apparent, as in the other named diseases. The distance to be traced through backwards to the ancestral origin of diseases which are acknowledged to be hereditary, may be far more considerable in some complaints than in others; the periods of their transmission may as greatly differ as many other of their apparent and characteristic qualities differ, and this observation may with much aptness apply to cancer. Its origin may even precede great-grandparents and descend from one source even amongst so many individuals who were predecessors paternally and maternally; hence its inheritance can, in many cases, by no means be traced. Though it is the common belief that a tendency or diathesis will in time wear out in any particular strain of blood, yet we possess no rules or data whereupon to form a judgment as to the rate, the quickness or slowness, of such obliterating process on the part of time; and a number of circumstances may retard the extinction of the proclivity of the inherent pathognomon. These speculations and hypotheses may in the main be but vague surmises, still they may have some foundation in truth. It is by no means improbable then, as above implied, that our present notions pertaining to the transmission of personal qualities are too limited, and have too much of brevity. History tells us of mental proclivities, such as fierceness and bravery and timidity or vice, running through a line for many generations, and of the same as regards physical distinguishments, and thus it may be with what in the present state of our knowledge we term proclivities to disease, which can only be certain through inscrutable material impressions and absolute variations. There are many other considerations of much interest respecting malignant formations which, if entered upon, would need an extended disquisition, but it may here be concisely remarked, as presumptive by parity of reasoning, that instead of this specific growth alone appearing in some members of a family, in certain individuals of the same stock growths of another and non-malignant nature, consequent on certain peculiarities in the organism may be, supply their place, because it has been noticed that families prone to cancer are also prone to other kinds of tumours. And the analogue of such facts is discoverable in the prevalence of other types and their congeners of disease. In gouty families, rheumatism is liable to prevail; glandular enlargements are apt to come on amongst the phthisically inclined; epilepsy and insanity often have some covert relationship; fault in the renal functions and skin affections doubtless stand in marked sympathy with each other; and there are good grounds for believing that groups of diseases of kindred type are to be discovered

in different families. Again, that these diathetic heritages are lifelong can hardly be contended; and they may innocuously subsist, it is possible, even to the end of life, when no superadded conditions come to cause the evolution of the kind of maladies to which they are the forerunners. From personal experience, perhaps mental harass is more fertile than any other cause in the development of the cancerous affection, and this may mainly be by disordering the digestive process, and causing mal-assimilation; again, we know that the time of life when cancer appears is the time of life when other heterologous depositions are most apt to come on, as if the system freed itself, as it were, of some embarrassing material in approaching age by the evolution of anomalous and extraneous deposits. Lastly, another kind of proof is afforded of the intimate relation subsisting between the nervous system and malignancy when it is held in remembrance that those affected with cancer are not uncommonly affected also with some neurotic ailment. This, and many like circumstances, are in the elucidation of this terrible malady well worthy of continuous observation, as their study by bringing more openly into view fundamental causes might throw out some light to conduct treatment, which now gropes its dark and devious way, in a more correct direction. The following cases of cancer as it is exhibited when it primarily attacks the stomach may be regarded as not uninteresting.

CASE I.—I was requested by Dr. Johnson of this town to see with him Mr. S., who had for some weeks previously been under his care. The patient was head gardener to a gentleman residing in the neighbourhood; and he had regularly pursued his occupation up to the time of the more urgent symptoms of his illness. He was now, and had been for some days, confined to his bed. He was fifty-one years of age, and had always been a healthy man until about two years before, when he first began to experience what he conceived to be merely impaired digestion, for which the ordinary remedies had been employed. He had been slightly jaundiced. Subsequent to that affection, he had abscess of the liver, which opened externally; and for some months a sinus remained, from which a small quantity of purulent matter continued to escape.

At my first visit he had a cachectic look, was much emaciated, and then laboured under persistent sickness and vomiting; the ejections being sour, and a biliary mucous fluid. The respirations were not accelerated; percussion over the thorax generally elicited the clear pulmonic notes; and auscultation proclaimed no abnormal sounds. The pulse was 92, small, compressible, and regular; the cardiac impulse weak, not diffused; there was no valvular disease. On carefully percussing the hepatic region, dulness manifestly extended over a less space than natural; the abdomen was so distended with flatus that now palpation could detect no abnormalities of the viscera. Pressure at the epigastrium gave acute pain; and he described this pain as "sharp and shooting." The bowels were

regular; and, when they were moved, only small amounts of fæcal matter were voided. The urine was of specific gravity 1020; no morbid products were detected on the application of ordinary tests. He had had a variety of tonic and stomachic medicines without any material benefit. He had taken the bitter infusions, mineral acids, bismuth, quinine, oxide of silver, prussic acid, aloes, and belladonna, and other remedies of a similar kind. On a general review of the case, and when tympany existed, the diagnosis could be but doubtful. The solution of morphia, with hydrocyanic acid, were agreed upon, to be taken at short intervals; and concentrated beef-tea, with port wine, every two hours. Under this treatment, the sickness was for a time relieved.

I saw him in consultation again in the course of another week. The tympanitis had now subsided; and, on again examining the abdomen, we could feel an irregular hard lump, of about the size of a small orange, at the right epigastric region, corresponding with the situation of the pyloric orifice. It was now abundantly clear, from this fact, the history, and the whole accompanying symptoms, that this was a case of carcinoma. He continued to waste and decline in strength; the sickness, vomiting, and epigastric pain being to the last a persistent and predominant symptom. He died. No inspection was made.

CASE II.—The next example of this disease was in the person of Mrs. D., who came from a distance to consult me. Her case was reported as being one of stricture of the œsophagus. She was forty-nine years of age, married; her countenance was dusky, yellowish, anæmic-looking; the volume of flesh was considerably reduced. About two years before, she had first begun to experience pain at the epigastrium immediately after taking food. Her affection had been regarded by a hospital physician as dyspepsia, and by a general practitioner as mere indigestion; for which a great variety of remedies had been tried, yet with little real benefit. The loss of flesh and strength, anœxia, with occasional vomiting, becoming more and more pronounced, and the opinion having been given that the disease was stricture of the œsophagus, herself and friends became alarmed, and my advice was requested. Three months prior to my seeing her, she had had, from time to time, attacks of vomiting almost immediately after a meal, and the ejected matters were invariably sour.

When I saw her, she said the swallowed morsel always produced pain, and it “felt as if it stuck very low down,” on which account she had been compelled to live on fluid or on semi-fluid diet. The tongue was clean, smooth, and red; and the papillæ, even at the V-shaped circumvallate lines, were almost indistinct. Her bowels were regular; pulse small and weak, 92. Percussion and auscultation gave no indication of thoracic disease. The abdomen, on palpation, gave no evidence of lesion, except at a circumscribed place at the epigastric region between the mesian line and the anterior

border of the left false ribs. Over this space even moderate pressure gave great increase of pain. Pressure could be borne at the right side of the epigastrium. She said the pain was always in one place; that she could cover it with the palm of the hand; that it was a "sharp, pricking, wringing, sometimes a burning, pain." Her husband and daughter, who drove over with her, were much concerned at her inability to swallow solids, and were afraid of death by starvation. I softened an œsophagus bougie in hot water, oiled it well, and very cautiously introduced it. Not the slightest resistance was felt until its end reached the cardiac orifice, where there was slight obstruction; but excessive pain was produced, which was felt through into her back. The instrument was at once withdrawn, the object not being dilatation, but a mere help to diagnosis. From the history, symptoms, and all the circumstances, I did not hesitate to pronounce the case as being a fatal one. On careful manipulation, some thickening of the cardiac end of the stomach could be felt through the attenuated parietes. It was a plain case of carcinoma. I ordered pills, with extract of belladonna, aqueous extract of aloes, quina; and a belladonna and opium plaster to the epigastrium. I also directed her to have new milk, thickened with some farinaceous article of diet; concentrated beef-tea, with isinglass, tapioca, and port wine. The pain increased in intensity; her flesh and strength decreased; sour vomiting became more frequent; and the desire for food less and less; the difficulty of taking it greater; and she gradually sank, about two years and three months from the commencement of her illness.

CASE III.—I was desired by Dr. Johnson to see a patient who for three months previously had been under his care. He was a tall, powerful man, fifty-five years of age, of florid complexion, who, twelve months before this date, had enjoyed good health. He then began to labour under a sense of pain and fulness at the epigastrium, but he did not for some time subsequently seek advice. He consulted Dr. Johnson, who treated his case in the ordinary manner when such symptoms are exemplified. He had given to him, from time to time, a variety of stomachic medicines, which were followed by some temporary improvement. But he did not make progress, and my own opinion was asked. When I first saw him, the pulse was 78, volume good, and regular. The physical signs of the thoracic organs were natural. The tongue was covered with a thin creamy coat; his appetite was impaired; the bowels were inclined to be confined, necessitating the occasional use of some aperient. On examining the abdomen, the epigastrium was full, rounded, and preternaturally resonant on percussion. Pressure over this region, at the mesial line and towards the left hypochondrium, gave pain which extended into the left back. He placed his fingers on the precise spot, which "felt tender." No tumour, nor well defined hardness, could be detected. The kidneys acted normally. The urine was of specific gravity 1020; no morbid products were found, except excess of triple-phosphates. He had latterly become desponding, and was

easily fatigued. It was now impossible to say whether it were or were not malignant disease. There was as yet no great wasting, nor had he the cachectic expression. He had hydrocyanic acid, strychnine, aloes, extract of opium, extract of belladonna, belladonna plaster to the epigastrium, and like remedies, with a carefully regulated diet. He improved for a time; but the pain, which was of the stabbing kind, never entirely removed. He made no real progress; and he was recommended to go to Brighton, where he remained a month. On his return, he was thinner; and the face began to wear a haggard, sharper expression. Nitrate of silver, extract of conium, decoction of cinchona, and dilute nitric acid were given; and morphia at bed-time. He had more pain after meals; the vomiting matters ejected were always sour. He was ordered to have a liniment of camphor, extract of belladonna, tincture of opium, and chloroform, to be applied to the epigastrium.

We believed in the existence of malignant disease. The loss of flesh was rapid; the pain sharp and lancinating; the vomitings more frequent. He was recommended to consult Dr. Brinton; and, at Dr. Johnson's request, I wrote a short account of the case. That gentleman's reply was as follows:—

“I have examined Mr. — very carefully; and, on the whole, fear your opinion is only too correct. At least, I find considerable thickening of the stomach near its cardiac end; and surmise that a certain degree of softening and abrasion of the mucous membrane, if not some downright ulceration, is present here. At the same time, it is quite *possible* that these symptoms and appearances may be due to mere ulceration without a markedly cancerous deposit. Even in the latter case, I should hope much may be done, as I have certainly found in cases with peculiarities analogous to this, to relieve his sufferings and defer the result. The prescription and diet concur in essentials with the plan already pursued.” The prescription was for pills, with extract of colocynth and extract of belladonna, and quina; strong soups and farinaceous food for diet. During the next three months, all the symptoms were more pronounced. Emaciation went on; strength rapidly declined; he had pain without intermission; the sour vomitings soon after meals became more frequent; and the nature of the malady was only too obvious. At the epigastric region, to the left of the median line and towards the hypochondrium, there was resistive hardness, and even moderate pressure increased the pain. Morphia was given every night. The bowels were opened on alternate days by enemata. Lime-water or milk was given to relieve excessive acidity. He wished to consult Dr. Budd. Again, at Dr. Johnson's request, I wrote a concise detail of the case. Dr. Budd replied as follows:—

“I agree with you and Dr. Johnson that the disease under which the patient sent to me is suffering is malignant. The gastric symptoms and the loss of flesh are such as usually betoken malignant disease; and in the left epigastric region, to which you directed

my attention, an irregular lump can be felt. I would recommend a light diet, some soothing medicines, such as chloric ether, hydrocyanic acid, and tincture of calumba, bicarbonate of potash, or Vichy water; a belladonna plaster over the epigastrium; morphia every night; and occasionally a colocynth or aloetic pill."

In the course of another month, he became confined to the house. The opiates required to be very considerably increased. The emaciation became at length extreme. Port wine, brandy, iced champagne, concentrated beef-tea, for a short time extended his existence; and he died.

CASE IV.—J. T., aged sixty-four, a thin, anæmic-looking man, for many years had been in declining health. This gentleman told me that five years previously he began to experience much disorder in the stomach and bowels; the former frequently giving considerable pain; the latter being irregular in their action, with much tendency to be confined. He placed himself under my care. He had been treated by several practitioners, yet without deriving more than temporary benefit. He looked languid and haggard, the countenance always being expressive of suffering. The physical signs of the heart and lungs were normal. Pulse 76, soft, regular. He had pain at the right iliac fossa, described as lancinating and shooting up into the right back; also some pain on pressure at the epigastrium. He could lie on either side, but was most free from pain when standing. When he sat down or went to bed, the epigastric pain increased. Hence, at my visits, I generally found him walking about the room; and he would say, "I am tolerably easy when erect." When pressed at the right hypogastrium, pain was experienced; and percussion gave dulness, which, however, from time to time differed in extent and intensity. He was much troubled with flatus; and the bowels were rarely moved, except by artificial means. There was no disease of the bladder; the urine was normal both in quantity and characteristics. His appetite was impaired and capricious; he had now no sickness or vomiting. I ordered him nitrate of bismuth with infusion of calumba and tincture of henbane. The mineral acids, morphia, extract of belladonna, aqueous extract of aloes, and quinine, were given; and epithems, with belladonna, opium, and chloroform; and a diet selected of the most digestible and nourishing articles, as pounded meat, new milk, eggs, concentrated soups, jellies, and the like; wine and brandy in small quantities. Under this treatment, he for a time seemed to rally; his appetite was better; he slept longer; and he had more hope; yet the cachectic look was still present. There was a continuous loss of flesh, and the epigastric pain never entirely ceased. Persistent sickness and vomiting supervened; the ejections were a sour muco-biliary fluid, accompanied with much pain at epigastrium. I ordered hydrocyanic acid and solution of morphia, anodyne fomentations, and opiate enemata. Iced champagne and concentrated soups were given in small

quantities and at frequent intervals, as soon as they could be retained. He had a repetition of these distressing attacks, some of which continued for many hours. He gradually but surely lost ground. The appetite declined; he became more and more feeble and attenuated; pain, sickness, and vomiting being the predominant symptoms to the last, and he died.

Sectio Cadaveris.—The body was greatly emaciated. On opening the abdomen, the omentum was found reddish, vascular, and divested of its ordinary amount of fat. There was no excess of serum; no traces of inflammation in any organs inspected *in situ*. The peritoneum was quite healthy. The liver was small, yellowish, fawn-coloured, and softer than normal to the touch. On making repeated sections of its parenchyma, a nutmeg appearance was exhibited, more especially towards the borders; and this condition was associated with the fatty change. Microscopic examination showed the hepatic cells to be engorged with oil-drops; and the latter, of smaller size, were seen crowded together in grape-like clusters. Both kidneys were lobulated; the capsules could be stripped off without preternatural adhesions. Longitudinal sections of each kidney showed the pelvis and calyces to be filled with fat. The cones in some places had lost their normal configurations; and in some parts the cortical substance had become thin and diminished. The pancreas, duodenum, jejunum, ileum, colon, and rectum were healthy. There was no trace of disease at the ileo-cæcal junction, as anticipated during life. The bladder was healthy. The stomach, when manipulated before its removal, gave abundant evidence of lesion. A hard, irregular, resisting substance was felt at the lesser curvature. The organ being removed and laid open, some dark biliary grumous fluid was discovered in its cavity. Attached to the line of the smaller curvature was a large, irregular, nodulated, jelly-like mass, which extended between the cardiac and pyloric orifices; but both these orifices were quite exempt from disease. On making sections of this tumour, it presented a white-greyish mottled appearance, with distinct fibroid striations vertical to the axis of the canal; and this fibroid substance contained variously sized loculi which were filled with transparent and semi-transparent gelatiniform exudations. The base of this growth was hard and dense, its density increasing in a ratio with its approach to the peritoneum; it was confounded and incorporated with the filamentous and muscular tissues proper to the organ; and, when regarded at its peritoneal aspect in certain places, its irregularities had a rough tuberculated appearance. Reviewed as a whole, it formed an apt example of scirrhus-colloid cancer, so often discovered in its favourite *habitat*, the stomach. Juice expressed from a thin slice, and placed under the microscope, contained very numerous nucleated, non-nucleated, caudate, and fusiform cells; and interspersed were resplendent fat-molecules, all of which constitute the characteristic products of a heterologous or malignant growth.

CASE V.—B. U., aged forty-seven, was admitted into the hospital July 19th. On admission, he had an anæmic, cachectic appearance, the volume of flesh was much reduced, and he was labouring under ascites, and œdema of the legs. On being interrogated, it was ascertained that he had never had any serious illness, and always enjoyed good health, until about three years before, when he began to lose flesh, to fail in strength, and to be troubled with dyspepsia, which was accompanied with flatulence and pain after meals. Pains in the abdomen then also began to affect him, and these were sharp and lancinating. They were generally for a time relieved by the use of some mild aperient medicine. It was also reported that fifteen years ago he had an attack of jaundice. About four months prior to his admission, he began to be subject to sickness, which was occasionally followed by vomiting, the ejected matters always being exceedingly sour. These symptoms gradually became augmented. At the time of his entrance into the institution, the physical signs of the thoracic organs were normal, but his breathing was accelerated on any extra exertion. The abdomen, on inspection, looked round and smooth; fluctuation could be distinctly felt; and the abdominal cutaneous veins were large and turgid. Pressure did not produce any great degree of tenderness; pulse 80; tongue tolerably clean; the bowels were confined, but had until latterly been regular; urine was voided in small quantity, but, on being tested, gave no evidence of renal disease. Complaining of much nausea, he was ordered a mixture with hydrocyanic acid, bicarbonate of potash, and mucilage.

20th. He had considerable abdominal pains; the bowels had not been moved; and sickness continued. He had two aperient pills.

22nd. The bowels were not open; he had another purgative, and a large domestic injection, which did not produce the effect desired.

24th. Injections were administered by the long tube, but they did not bring away any fæcal matter. The pain and sickness were much the same as at the last report. Calomel and opium, and warm fomentations to the abdomen were prescribed, and in the evening a pill with croton oil and powdered aloes.

26th. The sickness and vomiting and abdominal pains were distressing; the bowels were still unmoved, and he made frequent attempts to have them relieved. Creosote, the citrate of potash, iced brandy and water, and champagne, were administered; but all remedies gave not more than very temporary relief. Fomentations and opiates produced some degree of alleviation.

27th. The abdomen was more tense, and the diaphragm evidently more pushed upwards, as shown by the increased difficulty of respiration. Believing it likely that paracentesis abdominis might confer some relief, it was resolved to have recourse to the operation. Three quarts of viscid sanguineous serum were drawn off; after which the patient for some hours was easier.

28th. Sickness, and vomiting, and pain in the abdomen returned, and the bowels had still not responded to the various remedies employed for their movement. He made repeated endeavours at stool, and expressed great discomfort at the disappointment. A large injection with gruel and turpentine came back devoid of faecal admixture; electrogalvanism was applied to the abdomen, but no tendency to evacuation followed this agent; opium suppositories, and ice to the spine, were ordered, with a view to relieve the pains, and mitigate the sickness. Food and medicines were, as they had hitherto been, almost instantly rejected. It was evident that he daily and rapidly lost ground.

July 31st. The bowels, after eleven days, were spontaneously opened; the motion was entirely faecal, moulded, and not in the least flattened. Vomiting of a stringy muco-bilious fluid, mixed with dark coagula or grumous blood, was most frequent; the ejections were not, nor had been, faecal.

During the following few days, the distressing symptoms described became still more formidable, and all remedial measures proved inoperative. His easiest position was when poised on the elbows and knees; he declared that in no other could he have the least respite from suffering, and in this curious posture he continued almost to the last. Large opiates by the rectum were repeatedly given, but with little or no avail. He died August 4th, the mind being clear to the close.

AUTOPSY made by the house-surgeon, Mr. F. Manser, twenty-three hours after death. There was great emaciation; the abdomen was full and rounded with dropsical fluid, and on being opened, a large quantity of clear, viscid, straw-coloured effusion escaped; the cavity was filled with the same secretion; the visceral peritoneum was red, thick, vascular, and membranous—conditions evidently the result of long continued inflammation. It was adherent to the walls of the abdomen over almost the entire inner surface of the parietes; albuminous exudations had soldered together the various organs into one confused and irregular mass, the sulci being obliterated, and the viscera cemented together into one large conglomeration; in the folds of the omentum, and retroperitoneal duplicatures, lay large masses of cancerous deposit, which broke beneath the fingers on moderate pressure, and which were of the scirrhus-encephaloid variety; the liver, stomach, spleen, and pancreas were welded together, and adherent by some adventitious bonds of union to the concave surface of the diaphragm. The stomach was small, thrust over into the left hypochondrium; and, on being laid open, it exhibited the same malignant deposition; the large curvature was thick and indurated, the mucous lining red and injected, and at various parts of its surface were small yellowish eminences, or mammillations, of the size of rice to that of small horse-beans. Sections of the organ showed the pyloric end to be but little thickened; the orifice was, however, nearly obliterated. The liver was large and

congested; and, on being freely cut into in numerous places, no cancerous deposit was revealed. The pancreas was of scirrhus hardness; the spleen and kidneys were natural; the other abdominal viscera presented no conditions worthy of remark. With the exception of some ancient pulmono-costal adhesions, the thoracic organs exhibited the ordinary after-death appearance.

This man's malady, at its commencement, was characterised by that insidious and stealthy progress common to the coming on of malignant visceral disease. At the first, his ailment consisted in a gradual decline of health and strength, rather than in any prominently marked morbid condition. He lost flesh, he was often out of spirits, and he attributed the *malaise* under which he laboured to dyspepsia. The abdominal pain which in the course of time troubled him was doubtless caused by the mechanical pressure of a heterologous deposit; and the mitigation of this pain, by the mere act of unloading the bowels and giving more room, can easily be understood. It was improbable that the fundamental cause of the ailment lay in the liver, because there had been no attack of jaundice since the accession of his illness; no history of the passing of a gall-stone; no abnormities in the colour or other qualities of the alvine and renal excretions; and because the chief seat of pain was, and had been, at the umbilical and epigastric, and not in the hypochondriac region. The sickness at length came on in a grave and unconquerable manner, as it not unfrequently does in organic disease of the stomach. It was more formidable and incessant than in any mere hepatic affection. The prominence and turgor of the abdominal veins added to the great presumption of malignant action, when regarded in connection with other facts, and it was obvious that the portal circulation was organically obstructed. The long and obstinate confinement of the bowels was a probable consequence, when such large anomalous growths could not otherwise than interfere with the peristaltic action of the tube. It was evident before death that the rectum and sigmoid flexure were not the seat of impediment, and inspection confirmed this opinion. The electro-galvanism produced on each application ocular contraction of the abdominal parietes, and the internal shock was felt by the patient, but it is more likely to be beneficial when the cause of obstruction is only spasmodic. The absence of stercoraceous matter in the vomitings was a negative fact, discountenancing any notion as to the presence of ordinary ileus. The tapping was not followed with that ease and alleviation of existent symptoms which generally succeed, and for some time continue when the serosity eventuates from hepatic obstruction, or chronic peritoneal inflammation. In the example now given, a few hours sufficed to bring a return of the pain, atrocious as it had been before the operation. If such phraseology may be employed, there was an introversion of thought in this man, during the termination of his illness, which is not uncommon in acute and desperate abdominal affections, which is always very

significant of the gravity of the case, and which is not misinterpreted by the practical physician. His mind seemed constantly occupied with the disturbance and suffering within himself, just as we observe in acute peritonitis, or in peritoneal perforation. The entire treatment after his admission into the hospital could scarcely be said to do more than in trifling degree palliate his sufferings. Such relief as he received was from opiates. The posture, described by being on his knees and elbows, it is possible gave some ease by the large morbid growths thus not pressing upon the great splanchnic nerves, as they would necessarily do when he was in a recumbent position. The inspection exemplified ancient peritoneal inflammation, and the subacute condition still going on. Commencing as it had done in the circumscribed form, it had become diffused over the whole cavity. The displacement of the stomach and the almost obliterated pyloric orifice, without enlarged pylorus, were unusual, and worthy of note. This kind of cancer, accumulating in the peritoneal sac, is much less common than the carcinomatous deposits in solid and hollow organs; but we do sometimes meet with it, as in this instance, in huge irregular masses in front of the vertebral column. Its attachment to adjacent surfaces may be very inconsiderable, and then only to areolar tissue. This example was scirrhus-encephaloid; but the encephaloid exhibits so many varieties that it is often but an arbitrary distinction which defines the line of demarcation between the scirrhus, the colloid, and the encephaloid, as they graduate into each other.

CASE VI.—G. H., aged fifty-two, a farm servant, was admitted into the hospital on April 30th. On admission he was labouring under general anasarca; the legs were extremely œdematous, fluctuation could be distinctly felt in the abdomen, and the subcutaneous cellular tissue of the penis and scrotum was greatly distended with dropsical fluid. On interrogation, it was stated that for three years he had been in failing health; he had latterly lost flesh, the strength had declined, the appetite had been impaired, and occasionally he had been troubled with flatulency at the stomach. Physical signs of thoracic organs normal. Pressure at the epigastrium did not produce pain. Hepatic dulness exceeded normal lines of the organ's extent. Occasionally had sharp shooting pains, which extended into right back and shoulder. Manipulation detected no particular seat of tenderness in any part of abdomen. Had not had sickness or vomiting, nor did he complain of any urgent uneasiness after his meals. Diarrhœa had of late become a frequent symptom, the dejections being light and clay-coloured.

On the usual tests being applied, the urine exhibited no morbid characteristics. Pulse 84, regular, and of good volume. Was ordered an astringent mixture, with chalk, opium, and catechu. He subsequently took the decoction of broom-tops, with the nitrate and acetate of potash and the compound spirit of juniper, and alteratives, under which treatment and the use of needle punctures the dropsical

symptoms were mitigated, and he expressed himself as being better. But it was evident that he made no real progress, and that the beginning of the end had come. Though no tumour at the epigastrium could be detected, and though sickness, vomiting, and pain were not symptoms, it was extremely probable that he laboured under malignant disease. On June 28th he became jaundiced, and from that date to his death, which occurred on July 12th, he had sickness, accompanied with much epigastric pain.

The *autopsy* was made by Mr. F. Manser, twelve hours after death. The surface generally was of a yellowish-lemon tinge, and the subcutaneous cellular tissue surcharged with serous fluid. The abdomen contained a large quantity of dark serum, in which were floating flakes of coagulable lymph. The large bowel, liver, and stomach were adherent by organised masses of albuminous exudation. Liver much congested, and gall-bladder empty. Pyloric end of the stomach and a considerable portion of the large curvature were thickened and indurated by cancerous deposit, both of which were leathery on being cut. The enlarged pylorus formed a tumour, which pressed upon the *venæ cavæ* and gall-bladder. The internal organs seemed stained with bile. Pyloric orifice patulous. On various sections being made of the liver, no cancerous deposits could be discovered in the parenchyma. Kidneys and other organs were natural.

The freedom from pain and sickness until a few days before death was a curious negative fact in this man's case, because inspection declared that organic disease had been long existent, and because cancer of the pylorus, in the great majority of instances, is characterised by long-continued, often by excessive, suffering. No tumour could be felt at the epigastrium, and the pain, when it did come as a symptom, was rather referred to the region of the right lobe of the liver than the stomach; whilst the jaundice, the increased line of hepatic dulness, and the diarrhœa, seemed to point to this viscus as the location of the malady. But it is of practical importance to bear in mind that the pain in cancer of the pylorus is not always felt at the pyloric region. It is sometimes reflected into the back, simulating spinal disease; and sometimes it is described as being low down in the right side of the abdomen, as if the complaint were seated at or near the *cæcum*. Again, though pain is the very common accompaniment of cancer, there are exceptional cases in which it is comparatively trifling. In uterine cancer there may be an almost total absence of pain from first to last. The mechanical pressure of the tumour on the *venæ cavæ* fully accounted for the congested liver and general dropsy, as it also did for the empty gall-bladder and the jaundice. The diarrhœa was, doubtless, referrible to the non-admixture of bile with the contents of the digestive canal, to the imperfectly-disintegrated food caused by disease of the stomach and the patulous orifice, and perhaps, also, to the compressed inferior vena cava, giving rise to backward congestion in the extreme vessels proper to the mucous lining of the alimentary tubes.

CASE VII.—The next example which I shall give is that of a married woman, forty-four years of age, and who had had eight children. She was thin and anæmic, and bore all the facial expression of organic disease. It was reported that during the three or four previous years she had been in failing health, and had repeatedly been affected with painful and protracted attacks of indigestion. For more than a year she had complained of sour eructations accompanied with pain at the stomach and occasional sickness and vomiting. The latter symptoms gravely increased, and the nausea and sickness were so urgent as to become very distressing. She first became an out-patient of the Hospital on April 3rd, and then she was continually sick and constantly vomited her food, these emissions generally being about a couple of hours after meals. The bowels were, and long had been, obstinately confined. She gradually lost flesh and strength. The pain at the pit of the stomach was her perpetual trouble. On examination of the epigastric region, a large, hard lump could be felt at the pyloric end, and the emaciation was so excessive that this tumour could be taken hold of by the fingers, and be freely moved. There was no enlargement of the liver, nor apparently was there any other organic disease. She by slow degrees wasted away, being at the last a painful picture of extreme emaciation, and died 6th July.

An *inspection* was made thirty hours after death. On making an incision down the middle line not a morsel of fat could be seen, and the muscles were wonderfully wasted. The lungs were small and shrunken, but everywhere crepitant, and the heart and large vessels were natural. On opening the abdomen the stomach was discovered large and distended, and on removal it was found to contain a couple of pints of dark grumous pultaceous matter, which was evidently retained ingesta mixed with blood. At the pyloric end was an indurated, oblong tumour, which was dense and resistive to the touch. The outlet was so contracted that the index finger could not be passed through the orifice into the duodenum. It would only admit a goose-quill. On making a free section of this morbid growth a dense, almost cartilaginous substance of nearly an inch in thickness had been superimposed upon, and supplanted the proper tunics. The mucous membrane was at various points raised up in nodulated, irregular mammillations, and this thickening abruptly terminated at the juncture between the pyloric end of the organ and the duodenum; ulceration had, however, become established within the duodenal space. The other solid abdominal organs were carefully examined, but no cancerous deposit could in any be detected.

In the instance of this woman it is presumptive that the disease had for some time prior to her seeking advice been in insidious existence; impaired digestion and the gradually failing health, and the sour eructations and attacks of sickness, were all characteristic of the latent progress of the malady. Again, it is worthy of note

that the vomitings came on just as, as the rule, it happens in malignancy of the stomach when the pyloric end is affected. By a retrograde peristalsis the organ is excited to emesis, and thus by the semi-digested contents being removed, it for a time is rendered quiescent, when the sense of uneasiness or more pronounced pain obtains in less degree. This example also showed how these cases sometimes go on to very extreme emaciation; the outlet being so nearly closed as mentioned in the report, death becomes inevitable by inanition. The inelastic scirrhus deposit is sometimes such as to absolutely close the orifice; and if this woman had lived but a short time longer it is presumptive there would have been the entire abolition of the pyloric outlet. The ulceration had extended within the duodenal section of the tube, but the affection is not apt to spread far into the portion of the canal when it primarily comes on in the stomach.

The following are good illustrations, when the pyloric orifice is affected.

CASE VIII.—A single lady, then sixty years old, came under my care in April. She was somewhat inclined to be stout; she was of light complexion, and had the anæmic paleness of the features. Many years previously she had suffered much from menorrhagia, and after that affection she never fully regained her health. When I saw her she told me she had much inability to walk, and only took exercise in her carriage, consequent upon a fibroid tumour of the uterus. Her appetite was often impaired; she had much difficulty with the bowels, and the alvine excretions from time to time denoted hepatic derangement. She then called my attention to a small, hard, painful tumour, of about the size of a small walnut, in the left breast. On careful examination I believed it to be scirrhus, and I advised its removal, to which proposal the patient assented. My friend Mr. Rix was called in consultation; he endorsed my opinion; and he excised the entire mamma. On placing a piece of the tumour under the microscope, the ordinary and distinct characteristics of malignancy were detected. The wound healed without a drawback, and the patient returned to the condition of health in which she was before the operation. During the subsequent seven years my attendance was occasionally needed, but in this interval she had no acute illness, and her attacks of indisposition were generally dyspepsia, hepatic derangement, or perhaps a moderate diarrhœa. In the latter part of October she sent for me. I thought her looking paler and more wan than ordinary, and she seemed out of spirits. She told me her appetite was not good, and there was some tendency to nausea, but she had no pain whatever. There being a slight yellow tinge in the countenance, I ordered a mild alterative with a blue pill, compound rhubarb pill and henbane, and a stomachic mixture with ammonia calumba and the syrup of orange-peel. After pursuing this treatment she seemed somewhat improved. But the appetite did not come back; I varied her strengthening medicine, and gave

her iron. She continued the remedies, and paid great attention to a carefully selected diet, which I particularised. In no great length of time attacks of sickness came on; she felt prostrated, and there was evidently declension of strength. At the gastric region, and at the seat of the pylorus, I felt, as I conceived, on deep pressure, a small hard lump. Then pieces of black blood were voided with the vomiting. She slept badly; she began to lose flesh, and the strength was evidently declining. I communicated to her friends my suspicion of malignancy. The downward process had become unusually rapid. Sir William Jenner came to meet me in consultation. He utterly concurred with my diagnosis, and as to the nature of the hard lump felt at the pit of the stomach. He gave no hopes of recovery, nor hardly any of amendment. The vomiting became much more urgent; there were more and more dark coagula, and blood evidently passed by the bowels; and the emaciation in marked manner went on. She could keep little in the stomach, the pulse became feeble; she slept a good deal, but had no continuous and refreshing sleep; and it was evident the beginning of the end had come. She gradually sank in strength, became in a dreamy and unconscious state, and died on the 11th December.

The case was of some interest, more especially as reviewed in its clinical history. The menorrhagia, and afterwards the fibroid tumour, which prevented her taking exercise, caused continuously impaired health, and the vital powers generally were lowered. The dyspepsia and frequent irritation of the *primæ viæ* were conditions which are now more fully acknowledged as the forerunners of these mal-assimilative states which are followed by the malignant change. Again, here was a clear and an indisputable example of what a long period may elapse when the disease lies in abeyance. Seven years and six months passed over between the time of the operation for the tumour in the breast and the commencement of those symptoms which indicated a return of the complaint in the stomach. Her last illness went on with unwonted progress; and doubtless the frequent recurrence of gastric hæmorrhage greatly expedited the end.

CASE IX.—The case now about to be concisely related was one which presented certain features of considerable interest. C. C., a married woman, was admitted into the Hospital on the 24th of October. It was reported that both her parents lived until more than eighty years of age. She said she had always been a delicate woman, had worked very hard, and that she had had much mental anxiety. She had a grave fever when sixteen, and during the previous ten years had been more or less ailing. Some eight or ten weeks before she came into the institution, sickness after food became a prominent symptom, and she had occasional attacks of diarrhœa. She had tenderness at the right hypochondrium; she had lost flesh and strength; her aspect was markedly cachectic; and it was evident she laboured under organic disease. The physical signs of the thorax were normal, nor were there any indications of renal affection.

The loss of flesh went on, and the emaciation became in extreme degree. The sickness and vomiting were at length so continuous and excessive, that even beef-tea and milk were in a few minutes rejected. Near to the right costal edge there could on careful examination be felt a certain amount of thickening, but to very small extent. She experienced some tenderness on pressure, and the epigastrium was markedly full and rounded. Slight percussion elicited great resonance, but there was no diffused abdominal tenderness. The case was at the time of her admission regarded as malignancy at the pylorus. She was treated with bismuth, morphia, prussic acid, creosote, lime-water, and like remedies, but with little benefit. The sickness was simply uncontrollable. She gradually became thinner and weaker, and sank from inanition and asthenia.

On an *inspection* being made forty-eight hours after death, there was hardly any fat in any part to be discovered. The stomach was found large, thin, and enormously distended. It seemed to occupy the greater part of the abdominal cavity. The liver was abnormally pushed downwards, and the transverse colon was thrust lower than natural. At the pyloric end of the organ, just at the juncture where the duodenum commences, was discovered a small, hard lump, which had so constricted the part and diminished the outlet, that even the end of the little finger could not be admitted. The adventitious substance, on being cut through, and more carefully examined, was found to be true scirrhus, and without any accompaniment of that form of cancer known as colloid, and which is not unfrequently noticed in association with the denser malignant product, at this particular part of the digestive canal. It is worthy of remark that these previously named two results, extreme emaciation and unconquerable sickness, were not so much dependent on the amount of cancerous product as on the place where it was deposited. The growth being thrown out at the narrowest part of this section of the digestive tube, the occlusion was nearly complete, and being the scirrhus formation the physiological efforts of the organ could not propel the gastric contents forward, the orifice being closed as if by a hard ligamentous band. The resistance at this point by giving rise to ceaseless and futile endeavours at propulsion, and the retention of accumulated ingesta, doubtless caused the remarkable distension above described, and this morbid ligature, as it might be termed, being applied at the commencement of the duodenum, sickness and vomiting would of necessity follow, and thus by so little, and finally by no, nourishment passing down into the bowels the extreme and very unusual emaciation received full explanation. The case was one which from the kind and mode of cancerous deposit rendered it exceedingly exceptional.

CASE X.—J. P., aged fifty-seven, was admitted into the Tunbridge Wells Hospital, June 18th, for what was supposed to be intussusception. On making inquiry it was found that he had been ailing

for some months, and had complained during the winter of pain in the left side and into the gastric region. He had been confined to his bed for about a fortnight before he came into the hospital. He suffered during this time from obstinate constipation and intercurrent attacks of pain in the gastric region. He only vomited three times during the fortnight, and it was related that there was nothing peculiar in the appearance of the matters ejected. He looked like a man much older than his years. The emaciation was great, but his features were not markedly cachectic. He complained of much weakness and occasional attacks of pain, which, however, were not increased after taking food. The patient said he felt the pain beneath the navel. No tumour could be felt in the abdomen, nor did he complain of any tenderness when pressure was made at any part of the body. In the course of a couple of hours after he came in he vomited about half a pint of dark grumous matter, but not of the coffee-grounds character. He also vomited once the day after his admission. The vomited matters this time were not so dark. During the next night he was suddenly seized with agonizing pain in the abdomen. There was great and diffused tenderness to the touch, his features became pinched and drawn, the pulse small and quick, and the extremities became cold. It was beyond dispute that flagrant and fatal peritonitis had set in. He remained in this condition until the evening of the 20th, about twenty-four hours after the accession of the peritonitic symptoms, when he died.

On *inspection* a large quantity of serous fluid was seen in the peritoneal cavity. In the neighbourhood of the pylorus the effusion was sero-purulent. The pyloric end of the stomach was discovered to be thickened by scirrho-colloid cancer of about an inch in thickness. In the front of this deposit, at the anterior aspect of the smaller curvature was discovered a circular perforation, which would have admitted a large pea, and the edges of this circular opening were indurated. There had evidently been extravasation of the contents of the stomach into the serous sac, which at once gave rise to diffused inflammation of the peritoneum. It is to be observed that perforation in malignancy of the stomach is not so usual as it is in chronic and simple ulceration of this organ, because there is more usually a welding together of adjacent surfaces, and the adventitious product is more prone to contract the cavity than to destroy by ulcerative process the coats of this viscus. It may in passing be remarked that constipation is very common in cancer of the stomach, and, as in this example, the attacks of gastric pain may only be occasional. The vomiting with him was by no means so urgent a symptom as it is in some cases, and such fact may be mainly accounted for because the outlet into the duodenum was not so much lessened as it is in some instances. When the ingesta cannot pass into the bowels, reflex action becomes excited, and the organ relieves itself of its contents by the act of vomiting. It is

worthy of note that he referred the pain down so low as the umbilicus. The pylorus gravitates down into the abdominal cavity consequent upon the increased weight which it has acquired by the deposition of a large quantity of morbid product. This fact is of practical importance, and one which ought not to be lost sight of in diagnosis.

CAUSES.—To attempt to assign any real or regular *cause* of cancer would be at the best but a vain endeavour; and all that we can assert, in the present state of our knowledge, are mere hypotheses and vague surmises, which are either not borne out, or are absolutely refuted, by the facts which accumulated cases present. We know, however, that some occult cause, whatever it may be, effects a very potent change in the fluids; that it institutes some morbid condition of the blood capable of favouring the genesis of those flagrant cell-growths known as malignant. We see this condition in persons whose bodily conformation and external appearances are most opposite; sometimes in the ruddy and muscular, as well as in the pale and attenuated. Absolute cancerous material cannot be transmitted with the germ; but some hidden, inscrutable impress is transmissible, which impress at a remote period favours the development of that product; and we must confess that it cannot be entirely divested of any material relations. That constitutional tendency is, however, very greatly promoted or retarded by the operation of external agencies; and there is no doubt that a high state of civilisation conduces to its progress and results. With the exception of the uterus, there is no organ so prone to cancer as the stomach; numerical data in our own and other countries having abundantly attested this fact. Men are more decidedly prone to it than women, probably on account of their more intemperate habits, greater exposure to vicissitudes of temperature, and greater mental anxieties. Some few instances are given of its occurrence before the age of thirty. It is, however, very seldom observed before the age of thirty-five; far more frequently in those approximating fifty, and in still more advanced life. It belongs to those heterologous changes in the assimilation of the tissues which proclaim declension of vital power, and are intimately associated with age. There is no reason for believing that one class is more prone to it, or enjoys a greater immunity from it, than another. We meet with it in persons occupying every social position—in the well-nourished, as well as in the half-starved; in those who live in the country, as well as those who live in the cities.

PATHOLOGY.—*Pathological* investigation has shown that in the great majority of examples it is primary cancer which affects the stomach. This organ may, it is true, be the seat of the secondary form; but such cases are mere exceptions to a great general rule. The lymphatic glands may become contaminated by the presence of the disease in neighbouring viscera; as, for example, when the head of the pancreas, the liver, the spleen, the omentum or mesentery, are affected.

Some pathologists have affirmed that it is the colloid variety which is most generally found in the stomach. It would, I think, more correctly express the fact, if we say that it is the scirrho-colloid which is most frequently met with in that particular situation—the hard, fibroid basic substance upon which is superimposed the gelatiniform, locular mass. Colloid may and does co-exist with the villous, encephaloid, and melanotic forms; but these combinations are not nearly so often observed. The carcinomatous matter is infiltrated into the areolar tissue; because, in such loose and comparatively unresisting structure, it there finds less opposition to its deposit. In the course of time, the muscular and other tissues become enroached upon, and cancerous cells are formed within the muscular filamentous sheaths, the molecular constituents of the muscles being absolutely displaced and occupied by the new formations. One of the great characteristics of carcinoma is displacement and occupation. The product which is substituted not only does not possess the secretory capabilities of the parts removed, but it gravely interferes with the functions of the organ or organs which it has selected as its *habitat*. Again, the vitiated secretions, which are poured out into a hollow viscus, confer additional disorder. Carcinoma of the stomach fully illustrates this evil. The large jelly-like mass, by mixing its perverted exudations with the gastric juice, so injuriously operates upon the normal qualities of that fluid as to render it quite unequal to the due performance of its office; hence one cause of the sour ejections, the dyspepsia, the occasional attacks of diarrhoea, and that gradual diminution of flesh and strength, which an impaired chyme must inevitably produce. The encephaloid variety grows most rapidly; the scirrhus most slowly. Scirrhus and colloid may exist in the stomach for years before they destroy; the encephaloid will produce a fatal issue in the course of a few months. The one typifies the acute, the other the chronic form. The encephaloid and scirrhus are considered to give the most pain; the colloid the least. The loculi or alveoli, which are so characteristic of the colloid, are formed simply by irregular infiltration; they vary in size and configuration, according to the circumferential pressure, the amount of fibrous tissue, and their deep or superficial position. In the stomach and peritoneum, the colloid mass is more diffuse and less nodular than when deposited in glandular structures.

Microscopic investigation has in latter years cleared up much that was previously obscure respecting the ultimate structure of cancer; and, by this acquired knowledge, diagnosis has been rendered much more certain than it was when mainly based upon clinical observation and empirical practice. Cancer-cells are regarded by Lebert as modified lymph-cells, often monstrously altered in size. Collis says they present more or less resemblance to typical forms; and in any specimens there will be much variation in the size and outline of individual cells, yet with much elementary similarity in the tumour. Lebert describes the colloid cells as being

large, pale, oval, round, or tubular, lying in clusters. There are also small granular irregularly shaped corpuscles, which are regarded as cancer-cells hindered in their development. The colloid variety may be seen as a fibrous meshwork, the loculi being filled with granules, and acetic acid brings out the elongated nuclei in the stroma. The pyloric end of the stomach is most prone to carcinoma; next in frequency, the cardiac orifice; after that situation, the lesser curvature. The splenic end is least liable to the affection. It is a curious fact—nevertheless, one which is true—that the deposit is, as before remarked, rarely or never seen to extend into the duodenum; and the only reason why this abrupt termination thus obtains appears to be, that the duodenum is far more scantily supplied with areolar tissue than the stomach. The mass may present much resemblance to effused lymph; and it should not be forgotten that lymph will sometimes be deposited in the walls of the stomach, especially towards the pylorus, to considerable extent. But the malignant growth is much less uniform in its configuration; and there is no superficial softness in mere lymphic deposit. When the disease pervades the cardiac orifice, the growth will extend into the œsophagus, and cause organic stricture. When the liver becomes secondarily affected, the germs are transferred by the lymphatics and the veins, especially by the latter; because, it should be remembered, the gastric veins run to the liver.

The reason why the lungs are not implicated in carcinoma of the stomach is supposed to be on account of the cancer-cells being too large to pass through the hepatic lobular plexus. When the liver has become carcinomatous, sometimes unevenness and pitting may be felt on its surface. I have known this in marked manner when there has been much emaciation. The stomach is often found agglutinated to the liver, and more especially when the disease is at the pylorus. When the growth at the pyloric orifice becomes considerable, the pylorus will fall into the right iliac fossa, simulating tumour or impaction at the ileo-cæcal junction. I saw a case which I believe to be very illustrative of this fact. Rokitsansky has known the pylorus to touch the symphysis pubis. We have seen in Case IV. above recorded, that even when the mass hangs from the lesser curvature, the pain may be chiefly referred to the right fossa. This is a fact which, in a practical point of view, is of much importance. This falling-down can, of course, only be when there is no attachment to neighbouring viscera. On reference to Case IV., it is stated that the patient was always in the least pain when in the erect position. The autopsy fully explained this peculiarity. The mass was pressed upon in the sitting or lying postures; but, on the resumption of the erect position, it would hang tolerably free in the gastric cavity.

SYMPTOMS.—The *symptoms* by which this formidable disease can be recognised are, in the earlier date of the affection, often obscure, and by no means easy of interpretation. When it has made progress, the

diagnosis becomes comparatively easy. Sometimes it happens that the complaint has considerably advanced before it was even suspected. Again, it occasionally occurs, as Sir Thomas Watson has remarked, without from first to last presenting any pathognomonic symptoms at all. It usually begins with dull, aching pain at the epigastrium, sour eructations, and an uneasy feeling of fulness and distension, which are at first merely attributed to indigestion; afterwards, there are loss of appetite, depression of spirits, and, curiously enough, an unwonted petulancy and irritability of temper. The tongue is comparatively clean; nor is there any symptomatic fever. Costiveness, alternating with occasional attacks of diarrhoea, supervenes, doubtless caused by undigested food and that butyric fermentation which the unhealthy secretions from the cancerous surface are known to produce. No symptom, however, augurs greater import than the loss of flesh; and, if accompanied with the yellowish dusky cachexia, in addition to the more obvious and ordinary symptoms, the prognosis must needs be most unfavourable. When the ordinary stomachic remedies fail, and the wasting goes on, there can be but little doubt of malignancy. As the complaint advances, vomiting generally comes on. In two of the foregoing cases, it came on immediately after eating. In both, the disease was at the cardiac end of the stomach. In Case V., where there was partial stricture of the œsophagus, the food was instantly rejected. In all the cases, the ejections were invariably sour. Sometimes there will be mixed with the glairy mucus black or coffee-grounds-looking flakes, the results of hæmorrhagic exudation, or the erosion of some of the smaller vessels; or there may be active hæmorrhage. This symptom is in the latter stage.

At the first, simple ulcer may be simulated; but, in simple ulcer, the pain is not so persistent, nor so sharp and lancinating; it occupies but a small area; and the rest of the mucous membrane is healthy, and there is little or no loss of flesh. When the orifices are not obstructed, sickness is less urgent, and the patient lives longer. When the pylorus is the seat, a special train of phenomena supervene. This orifice becomes gradually narrower, until positive occlusion well-nigh results; the imperfectly digested food can then but with great difficulty pass through the contracted portal; the stomach labours to overcome the obstruction; and the applied hand can feel a vermicular movement resulting from its efforts. By this excess of action, and the abnormal gases which are generated by perverted secretion, the organ becomes large, and percussion elicits preternatural resonance. When there is constricted pylorus, the intestines are empty, and the belly drawn in—a condition which is seen in some other forms of disease; for example, in typhus, when there is diminished chyle and great deoxidation of the tissues. When the cardiac orifice is the seat of the tumour, the swallowed morsel gives rise to pain immediately after its descent into the œsophagus. There will then be instant rejection, or the food will

feel to stick as it were at the epigastrium; and the pain to which such obstruction gives rise is excessively severe. When the growth is in the lesser curvature, it very generally extends to one or both orifices. In Case IV. it did not do so. Sickness may be a distressing symptom even when the inlet and outlet are free from disease. The mental faculties usually keep clear to the last. In all of the above examples, this was the case.

DIAGNOSIS.—I have said the *diagnosis* is more difficult at the first than afterwards. When the affection has progressed, palpation will assist the formation of an opinion very materially. Pressure gives pain at some circumscribed spot. This pain often radiates through into the back. Frequently, a large, irregular, hard substance can be felt in the right epigastric region, between the mesial line and the right false ribs. The movement of this substance gives pain. When the cardium is the site of the growth, some thickening can be discerned (after emaciation has progressed) towards the splenic end of the organ. The patient's description of the pain should never be disregarded. Sharp, stabbing, hot, burning, were terms employed by the patients whose cases have been given above. We should bear in mind that the pain may simulate that of renal calculi, or ordinary hepatic pain, of tumour in the posterior mediastinum, of abdominal aneurism, or of lumbago. There may, however, be but little pain, as sometimes little vomiting, from first to last. I have known carcinoma of the uterus be attended with scarcely any pain. If the branches of the par vagum enter the mass, there will be great suffering. If the tumour lie in front of the abdominal aorta, it will be lifted up by the pulsations, and simulate aneurism. Negative and stethoscopic facts will, however, guard us against such a mistake. In chronic or acute irritation of the gastric mucous membrane, the pain is diffuse, and referred to the entire epigastrium, and not circumscribed as in malignant tumour. The ejected matters will assist in some measure in arriving at a correct diagnosis, not only as regards the true nature of the disease, but as to its particular position in the organ. Under the microscope, cells of a specific character can, on careful examination, be discovered mixed with the vomited fluids. If the growth be at the pylorus, the food will be partially digested; if at the cardium, it will generally be little altered. If there be much blood, we should suspect the encephaloid or melanotic variety. Notwithstanding all the foregoing rules for observation, necroscopy will from time to time reveal conditions unsuspected, and disappoint us by not displaying those which we had anticipated.

Some time ago I was requested by Mr. Hutchinson of Lambethurst to see with him a patient who had long been affected with persistent stomach-disease. There was no very decided cachectic expression; yet he got thinner, and his condition caused anxiety. The tongue was livid, flabby, smooth, creamy; the appetite impaired; the epigastrium full and resonant. Pressure gave pain, which was *not localised*, but diffused over the whole region. There was pain

after meals, but no vomiting. The urine was voided in normal quantity; specific gravity 1015; excess of triple phosphates. I gave it as my opinion, notwithstanding the loss of flesh and other doubtful symptoms, that his case was not malignant. Mineral acids, bitter infusions, morphia at bedtime, and a regulated diet, were followed by gradual improvement; and he became quite well.

An in-patient was admitted into the hospital under my care, in the person of a tall, powerful woman, who had been servant in a gentleman's family. For more than half a year she had had epigastric pain, and more especially after eating. She looked sallow, anæmic; and had become thinner. Her spirits were much depressed, and she believed she laboured under a fatal malady. A medical opinion had been given suspecting cancer. I was written to by the lady with whom she had lived, respecting her going into the Cancer Hospital. The epigastrium was rounded and resonant; no tumour; no hardness; and pressure gave diffuse dull pain, which did not lancinate into the back. Tongue creamy, flabby, not loaded. Right hypochondrium duller than normal. I expressed my decided opinion that her affection was not cancer. A blister to the epigastrium, a mixture with infusion of rhubarb and calumba and the bicarbonate of soda, with small doses of strychnine, mild mercurial alteratives, and an easily digested and nourishing diet, were followed by speedy improvement. She soon left the hospital well.

TREATMENT.—With regard to the general rules of treatment to be observed in cancer of the stomach, it need hardly be remarked that our best endeavours can only be palliative; nor can it be added that any agents can be administered which are likely to retard the progress of the complaint. The therapeutic measures and the kind of diet to be selected should in great degree be the same as those recommended in the article on chronic ulcer of this organ. All depressing mental emotions should be avoided, as well as every description of ingesta which might irritate the lining membrane of the stomach. The food should be light, digestible, and nourishing. Solids are to be utterly discarded. The various farinaceous articles of diet are to be taken; and these may be advantageously given in combination with soups, broths, and jellies; new-laid eggs, milk (mixed with lime-water when there is acidity), pounded meats, and like bland articles of food. With regard to medicines, the nitrate of bismuth, as a mineral astringent, has been much lauded. It may be given in combination with hydrocyanic acid and some bitter infusion. When there is excess of acidity, the aqua calcis is preferable to the other antacids. If this be not employed, Brandish's alkaline solution, with some aromatic water, will be found serviceable. Morphia, henbane, and conium I have found of great service, even at the earlier stage, in tranquillising the nervous system and giving sleep. When the disease shall have advanced, morphia is the all-important remedy. When sulphuretted hydrogen is developed, the creosote pills produce much benefit. The bowels may be regulated

by pills of aqueous extract of aloes, extract of belladonna, and quinine. An opium and belladonna plaster to the stomach has a comforting effect ; and towards the close, when the pain becomes excessive, opiate epithems are not to be omitted. When the stomach will not retain food, nutritive enemata may advantageously be employed. And if the irritability be great the hypodermic injection of morphia forms an excellent mode of producing euthanasia.

XVI.

CARCINOMA OF THE LIVER.

CANCER of the liver, in primary or secondary form, is of more frequent occurrence than cancer in any other organ of the body. Rokitansky regarded it as being present in one-fifth of the examples of malignancy in all other parts; and Oppolzer computed that its appearance in this gland might be looked for in about every eightieth autopsy of patients dying from all descriptions of disease. It is primary in about one-fourth of all instances of hepatic cancer, and secondary in three-fourths. In ninety-one cases tabulated by Frerichs one half were in association with carcinoma of organs whose venous blood flows to the liver. In one-third of the examples which are seen, it may be calculated that malignancy of the stomach has preceded. In primary cases it is apt to be extended to adjacent organs and structures, when the diaphragm, peritoneum, stomach, duodenum, pancreas, or spleen may take on the same morbid condition. It is very rarely present before adult age, and quite exceptional before forty. The period most prone to its development is from fifty to seventy. In twenty-nine cases referred to by Van der Byl the mean age of the males was forty-one, and that of the females fifty. Mettenheimer and Frerichs saw it each in one instance in a young woman of twenty, and the last named witnessed the affection in a young man aged only twenty-two. It seems to come on with equal frequency in both sexes. The organ may be so enlarged as to be five times its natural weight, and when thus augmented in volume it may descend low down into the abdomen, and the upper edge may be carried high into the chest. Van der Byl describes a carcinomatous liver which weighed twelve pounds; and Gibb relates an instance in which it weighed fifteen pounds fourteen ounces, and says it may even be twenty pounds. Each description of this morbid growth may be found in this viscus, but the scirrhus and medullary forms are most common, and these in varying proportions often co-exist. The colloid, alveolar, gelatinous kind is most rarely noticed in this organ, and Budd, Walshe, and Simon never saw it in the liver. When the product is scirrhus such may be chondroid or napiform; and when it is medullary there may be the solenoid or hæmatoid varieties. Its increase is far the most rapid in the medullary growth, when the patient seldom lives beyond a year; but

in scirrhus the masses are far slower in development. Formerly this material was not recognised in the situation now considered, but it was referred to as an adventitious substance, the result of hepatitis, or the masses were designated as tumours, steatomatous collections, or tubercles. Bayle and Farre were the first to more distinctly indicate the real nature of these bodies, and recent pathologists have with much care and minuteness studied their physical qualities and specific characteristics. Although cirrhosis is the most frequent organic change which takes place in the liver, that affection is most rarely associated with cancer in the organ, and thus it would seem that the essential conditions necessary to the one growth are not favourable to the generation of the other. The causes of carcinoma in this gland are as obscure and inexplicable as are the causes of malignancy in any other locality. Willigk and others have said that the irritation of gall-stones may constitute a cause, but there is no such accumulation of evidence as to substantiate this assertion. Budd is of opinion that it does not come on in people who have lived in hot climates, or who have ever been spirit drinkers, with more frequency than in others. The latter part of this statement may, I think, be contested, as there are reasons for believing that the intemperate use of fermented and alcoholic liquors, by degrading the general health, predisposes at least in some degree to malignancy. Probably that fret and restlessness of mind, incident to the age in which we live, by impairing the digestive process, and thus inducing mal-assimilation, is the most likely cause of cancer. There is no doubt, also, that there is an hereditary tendency, when progenitors have been similarly affected. It may be remarked that in all cases suspected of this ailment the cancerous cachexy will be looked for; it may, however, exist and have for some time preceded without there being any marasmic appearance. This disease in the earlier part of its course in some instances goes on in covert manner. The physical signs and palpation may not detect it, while at the same time central masses and external infiltration may have taken place. The deposit may be there without any change in the organ's configuration. In the later stages the nature of the complaint can, as the rule, with much distinctness be recognised, when the feel of the free, hard, and depending edge and the protuberances may be regarded as pathognomonic. Again, sometimes it happens that the sequential ailments, such as peritonitis, dropsy, or it may be chronic pleurisy, are so importantly looked upon that the antecedent and underlying malady is not discovered until revealed by inspection. And there are instances of this kind in which the complications become so prominent as to effectually mask the first pathologic change, and render an accurate diagnosis well-nigh impossible. Another fact may also be had in remembrance, that in some exceptional instances a fatal termination suddenly supervenes. This may be the case by a more diffuse peritonitis, by pleurisy with effusion in an emaciated subject, or it may be by hæmorrhage consequent on the

giving way of the hepatic serous covering in the hæmatoid description of the growth, or when a bloody cyst has formed.

CASE I.—G. B., a tall thin man, sixty years of age, who had long pursued the occupation of a gardener, applied as an out-patient, May 7th. Three years before that date he was stout and well furnished, and had always enjoyed good health. At that time, he had an attack of bronchitis, which was followed by a good deal of general debility. He lapsed into a state of continued indisposition, lost flesh, and became weak: he attributed this declension from his former robustness to indigestion, as the appetite failed, and he had a weight in the stomach after meals. He never had jaundice. For some time he had complained of this uneasy feeling of weight and heaviness, occasionally increasing into absolute pain, especially in the right hypochondrium and scrobiculus cordis. On admission, he had a markedly cachectic look, the sclerotics were blanched and bloodless, and the features shrunken, anæmic, and tinged with a dusky yellowish hue. He was evidently much emaciated, and the history of his ailment and present appearance very ominously pointed to malignant disease. The cardiac and pulmonary signs were natural; the pulse eighty, and regular, and the respiration twenty-three, easy and unembarrassed. On inspection of the abdomen, the epigastrium was full and prominent, and preternaturally resonant on percussion. The superficial abdominal veins were not notably enlarged. The ordinary hepatic lines of dulness were found to be exceeded at the right mammary and axillary lines, and the free margin of the right lobe of the liver could be distinctly felt a couple of fingers' breadth below the right false ribs. Between the costal cartilages and the mesial line pressure at once gave pain. He said that the sense of weight and fulness in this situation had latterly become far more urgent, and that the pain and flatulence now occasioned a good deal of distress. He sometimes had sickness and vomiting. The tongue was covered with a thin creamy fur, its edges being pale and indented. The bowels were and had been constipated; and the alvine dejections generally exhibited a deficiency of bile-pigment. The urine, with the exception of containing bile and an excess of lateritious and some purpurous deposits, presented no other abnormal characteristics under the ordinary tests. He was for some weeks treated with cinchona, hydrocyanic acid, belladonna, bismuth, lime-water, and the alkalies in combination with various bitter infusions, and occasional opiates; and the bowels were, from time to time, relieved by mild aloetic medicines. He was placed on a regulated diet, and he took a moderate allowance of wine. Under this treatment, for a time, he expressed himself as being decidedly benefited, but, as I had anticipated, the relief was only temporary; the gastric symptoms were not really ameliorated, and the tissue-waste evidently continued. At length he became unable to come to the Hospital, and he was subsequently attended at his own home by the House-Surgeon, Mr. Manser.

On July 28th he was in a very weak and an emaciated condition. He complained much of great weight and fulness at the pit of the stomach and in the right side. The attacks of sickness and vomiting were more frequent, and the retention of his food had become much more difficult. The edge of the right lobe of the liver projected fully three inches below the costal margin. There could, at this date, be distinctly felt two nodules, which were hard, smooth, of spheroidal configuration, of the size of a Spanish nut; and these were manifestly situate on the convex surface of the liver. There was no particular bulging of the organ, but, as above remarked, it abnormally depended. The superficial abdominal veins were full and easily traced, but not so turgid as to indicate any great amount of portal obstruction. He had not much pain on moderate pressure, but the jar of percussion at once gave pain. He was ordered hydrocyanic acid, morphia, alkalies, and opiate and belladonna epithems; and the pain and sickness were relieved by these remedies. He gradually declined, and died at the end of three months.

The examination was made forty-eight hours after death, the *autopsy* being performed by Mr. Manser. The body was greatly emaciated, and the surface generally tintured with a dusky yellowish tinge. On opening the abdomen, no serum flowed from the incision, but a small quantity of effused yellowish green fluid was contained in the abdominal cavity. The stomach lay in its proper position, but was smaller than in health; and, on removing it, its parietes were found to be much attenuated, and the orifices normally patulous. The liver was large, and occupied considerably more than its usual space; it covered the stomach, filled up the left hypochondrium, and protruded very notably below the thoracic border. Its convex and concave surfaces were crowded with round spheroidal or ovoid clearly defined nodules, which were of a yellowish straw or fawn colour. Some of these tumours were slightly elevated and perceptibly flattened or indented; and, where these flattenings and indentations were in apposition to the hepatic peritoneum, the serous membrane was less transparent or more milky looking than where it induded the intervening and natural surface of the organ. The nodules varied greatly in size, some being not larger than a swan-shot, a pea, or a hazel-nut, others being as large as a filbert or a pullet's egg. They were slightly adherent to the peritoneal investment by a delicate diaphanous filamentous structure. On removing the liver, and making numerous sections of its substance, these heterologous masses were found in every part of the viscus, differing in size in the same manner as they differed in size on the surface. Each growth, on careful examination, was found to be enveloped in the fine transparent investment above described, which constituted an easily divided band of union between the morbid product and the hepatic parenchyma. The formations were so numerous as to have very obviously encroached upon and abolished much of the tissues in which they were deposited. On cutting them open, the divided

surfaces very closely resembled the colour of their superficies. Their consistence was that of old cream cheese; they were quite homogeneous, devoid of vascularity or other conditions of organisation. There were no fibrous zeolite-like radiations from one or more central points towards the periphery which these bodies sometimes present, nor yet any fractuous lines passing through their substance. They bore moderate pressure between the fingers, but were more or less friable. Portions of these depositions being placed under the microscope exhibited an abundance of nucleated, elongate, or caudate cells, free nuclei, cells containing bile-pigment, a few scattered plates of cholesterine, some amorphous granular matter, and innumerable fat molecules. It may here be remarked that in this particular kind of carcinoma of the liver, minute inspection discovers the malignant bodies of every size down to those of microscopic dimensions. Indeed, between the rudimentary nucleated cancer cells and the normal hepatic cells there is little physical, if any, absolutely cognisable difference. In the fungoid and encephalomatous varieties, the cells are generally larger than the hepatic cells. Whipple describes the microscopic appearance as gland tubes lined with columnar epithelium, and this writer refers this kind of growth to the columnar cell epithelioma as given by Förster, Cornil, and Ranvier. The cancerous product takes the place of the hepatic cells, and it is believed that the primary morbid action is instituted in the interlobular connective tissue. The intervening hepatic parenchyma was of dirtyish light red colour. The ducts were pervious, and the gall-bladder was small and filled with light-yellow bile. The spleen was small, and, on being divided, its central portion was dark, pulpy, and semi-diffuent. The pancreas was atrophied, but not indurated. The kidneys were normal. The gastro-hepatic omentum was utterly devoid of fat, and had assumed the appearance of a red fibro-vascular membrane. On close examination, it contained innumerable small, hard, granular bodies, varying from the size of a millet-seed to that of a pea, and the microscope showed them in their elementary constituents, though of more fibroid tendency, to resemble the ultimate cellular and molecular components of the larger morbid products discovered in the liver. The other abdominal organs were healthy. The thoracic viscera were not examined.

The above recorded case is a typical example of one species of carcinoma not unfrequently discovered in the liver, and which recent writers on pathological anatomy have described with much accuracy. The morbid conditions of this organ during life are often, even under the eye of the most expert diagnostic, ambiguous and difficult; and the causes of this want of certitude in the distinguishment of hepatic complaints can, upon a cursory reflection, be well understood. The viscus, in its healthy condition, by lying beneath the concave surface of the diaphragm, and under the thoracic wall, is almost as hidden from sight and touch as the encephalic mass is

hidden by the cranium. Again, it may be gravely affected without its normal lines of dulness being extended; or there may be a greater or less degree of its dislocation, simulating tumescence, when it is in no wise diseased. Its enlargement may be resembled when empyema of the right thorax pushes down the diaphragm, when an encysted kidney is in apposition with its lower margin, in organic diseases of the stomach, and in cancer of the omentum. Malignant disease may be imitated by an impacted colon, by hydatids, and by tropical and pyæmic abscesses. Sometimes tumours will be formed in the right hypochondrium with such rapidity as to confer doubt as to their hepatic origin. The increase may be irregular; at one time it goes on with great celerity, at another time, in the same subject, its enlargement is slower. And sometimes fundamental and fatal changes may have been established in the substance of the liver, when the outward and visible sign of jaundice has not been apparent; or there may be hyperæmic tumidity and icterous discoloration when the disorder is functional and comparatively unimportant, and when no organic mutations have been instituted. The form of the liver may be varied by tight lacing, and by abnormal configuration of the lower part of the thorax; and its axis may be altered by the accumulation of gas in the stomach and intestinal canal, by ascites, by pericardial effusion, and by pulmonary emphysema. That renal should have been rendered far more precise and perfected than hepatic pathology may be easily comprehended, when it is taken into consideration that the ultimate structure of the kidney is less complicated, that its secretion can be obtained without admixture and with facility, and subjected to chemical and microscopical examination, which is not the case with the bile, and that the morbid products, from which essential inference may be deduced, are contained in the uriniferous tubes. And, if a passing comparison be made between the other larger solid organ—the spleen—and the liver, in respect to pathologic recognition, it may be held as a rule that absolute enlargement, cognisable and often very manifest, is the common condition of splenic disease, because its distensible trabeculæ and pulpy structure, under nearly all forms of its morbid state, render it prone to hyperæmia; and, when chronically affected, as in hypertrophy and purulent accumulation, the history, physical signs, and objective symptoms commonly conduct to a correct diagnosis.

The history and symptoms of this man were such as sample closely with what obtains in the ordinary illustrations of the complaints. His once healthy aspect and robustness of conformation prove, as I have in repetition observed, that cancer does not always, as was formerly supposed, come on in such as are of frail and delicate constitution. I have before repeatedly known those who were models of muscular power, and those who have been the verisimilitude of florid, well-furnished healthiness, become the prey of this fell and implacable disease, just as it sometimes is noticed in carcinoma of

the female breast when the patient looks well nourished, strong, and without the indications of any constitutional malady. There is no doubt that the bronchitic attack, by its induction of general debility, disordered digestion, and consequent mal-assimilation, favoured the development of this morbid process, where the diathetic tendency already existed, and needed but some cause of declension of vital power to act proximately and bring it into noxious existence. The feeling of weight and fulness in the right hypochondrium, the impaired appetite, the flatulence and the hypochondriacal depression, were symptoms highly characteristic; and they are generally experienced in the earlier and more obscure stages of the malady, before any tumour can be recognised, and when it is impossible to declare the real nature of the lesion. The non-febrile condition, the cachexia, and the loss of flesh were significant facts, as they should ever be regarded in such cases. That the liver was large when he first came under my care, palpation and percussion at once rendered evident; but its free border was then smooth and rounded, and such enlargement might be from causes other than malignant deposit, and from this symptom alone a correct diagnosis could not be inferred. It generally extends below the costal edge, and the chest-wall has a tendency to turn outwards. When the organ is naturally small the cancerous growth may not be felt. When the ductus choledochus is pressed upon, the gall-bladder may be so distended as to form a large bossy tumour, which, however, is softer than in carcinoma hepatitis. He had not had jaundice; but the absence of that symptom counted for little in the consideration of his ailment, because in cancer of the liver it often happens—indeed, it most frequently happens—that icterus does not, from the beginning to the end, supervene. The organ may be rendered three times its normal size from cancerous deposition, and no jaundice be produced. Frerichs says that it is of little value as a symptom, because it is not present in the majority of cases; and, of ninety-one examples of cancer of the liver, given by this authority, in fifty-two jaundice never came on. Of course this event often depends upon the fortuitous circumstance of the heterologous growth pressing upon one or more of the larger ducts; and when it does occur, it never disappears. There may, however, be what Virchow terms hamatogenic icterus—when it is of blood-origin, an event which this writer considers to be caused by the disintegration of a large number of blood-corpuscles. Sometimes a carcinomatous liver may not be at all enlarged, and a small cancerous mass may be formed within or press upon a duct and cause such obstruction as to give rise to intense jaundice; and sometimes there may be very obvious extension of the hepatic lines of dulness, and great hyperæmia of the viscus consequent upon the pressure of malignant tumour of the stomach, peritoneum, or pancreas, when hepatic cancer is greatly simulated. An apt illustration of what is now asserted was some time ago presented to my notice.

CASE II.—A farm-servant, fifty-two years of age, was admitted into one of my beds in the Hospital; and I at once regarded his case as that of malignancy. He had some slight pain at the epigastrium, but did not complain of sickness; he had a dusky, cachectic aspect, had lost flesh, and was becoming anasarcaous. The liver was large, the right mammary line was exceeded, the free border was below the costal edge; the stools were clay-coloured, and the urine contained bile. He became jaundiced; and this symptom, which was strongly marked, continued to the time of his death. The presence of primary or secondary cancer in the hepatic substance was not altogether improbable, from both negative and positive facts; because there had been no broadly marked indications of carcinoma of the stomach, nor could any distinct tumour at the pylorus or other part be felt; because there was little or no epigastric pain, no sour eructations, no sickness; because there had been dull, heavy, dragging pain in the right hypochondrium darting up into the shoulder; and because the liver depended below the costal margin, and deep persistent jaundice came on. The autopsy, however, exhibited, not hepatic cancer, but pyloric cancer which mechanically obstructed the *venæ portæ* and *choledochus duct*. The liver was large and extremely hyperæmic, but no trace of malignancy could be found in any part of its parenchyma. The dropsy and jaundice were at once explicable.

Not long ago, another illustration of the manner in which hepatic malignancy may be resembled came under my notice; and I may here not inaptly cite a few facts from the copious notes of this case, which now lie before me.

CASE III.—I was requested to visit a married lady of nervo-biliary temperament, fifty years of age, who had lost flesh, and who had become pale and anæmic. She had not long before sustained a bereavement which had given a shock to her constitution, and thrown her into ill-health. She had on previous occasions been under my care for attacks of cardiac asthma, which came on after any unusual cause of excitement. She complained of epigastric pains which darted into the right hypochondrium, of nausea, loss of appetite, and general *malaise*. The liver descended below the false ribs, and it could be traced above the fifth interspace. The epigastrium was full and round. The thorax presented rachitic antero-posterior flattening. There was no pulmonary disease, nor any auscultatory signs of phthisis. The tongue was flabby, but clean; the alvine and renal excretions were dark. The urine was very acid, and contained bile-pigment. She had lost some blood by hæmorrhoids, and there was a waxy, yellowish, cachectic look in her features. The epigastric pain, hypochondriac aching, flatulence, and nausea with occasional sour vomiting, were cardinal and continued symptoms. The varied treatment to which she was subjected gave not more than temporary benefit. Dulness in the upper third of both lungs in course of two months obtained, which was accompanied with slight

bronchophonic resonance, and some patches of moist crepitation. The cough was very trifling, and the sputa only consisted of occasional expectorations of glairy mucus, with some purulent streaks. The nausea, sour eructations, flatulence, occasional vomiting, epigastric pain, and hypochondriac weight, were symptoms which remedies did not more than briefly alleviate. In the course of time the legs became œdematous, and the loss of flesh and strength were more marked. A large portion of the lung-tissue remained pervious to air. The cough and expectoration did not increase; there were no notable perspirations, and no colliquative diarrhœa. It was evident she was not altogether sinking from phthisis. She died four months after I first saw her. Prior to her death, I was interrogated as to the nature of her malady, and was asked, and not without some show of reason, if there were internal cancer? I felt it difficult to answer the last part of the question, but had no hesitation in replying that the liver was organically diseased and very large, and that there was tubercle in the upper part of both lungs. I had given much thought to this case, but there were some conflicting and contradictory circumstances which rendered the ailment ambiguous. The dyspepsia, the gastric pain, the *persistent nausea*, the *sour eructations*, the wasting, the cachexia, in no slight degree resembled malignancy. The phthisical symptoms came on in secondary manner. Was it carcinoma of the stomach, with encephaloma of the liver? But at the free hepatic edge were no nodules, and the right lobe was smooth. Though phthisis and cancer do not often simultaneously occur, yet we know such is sometimes the fact. Sibley has given fifteen cases of the co-existence of tubercle and cancer. I pressed for an examination, and Mr. Manser kindly made the dissection. We found the upper third of both lungs to contain large amounts of grey and yellowish tubercular deposit, some of which was breaking up. The liver was extremely large, pale, and fatty; of the nutmeg variety. The *stomach was thrust out of its place*; it lay perpendicularly in the left hypochondrium, and its pylorus was quite over to the left of the mesial line. Its thus being twisted over into that situation, and pressed upon by the large liver, doubtless explained the gastric symptoms. The organ had been mechanically irritated. In the former of these last two examples there was carcinoma, and the most characteristic of the common symptoms were wanting; in the last named, the symptoms of cancer were simulated by other organic changes, and a peculiar and accidental occurrence. In both cases, dissection gave evidence of great practical significance.

The next two cases may with much aptness here be given as illustrative of the disease now described.

CASE IV.—Mr. Henning, of this town, gave to me the following particulars of an interesting case. He said about ten months before he was first sent for to see M. U., a married woman, fifty-three years of age. He had then known her many years, and, judging from her appearance, he did not suppose that she was labouring under

any disease. She was square built, of medium height, and fairly muscular. She was active in her household duties, and did heavy work as a laundress. When he saw her she was in bed, and had been unable to get up for the previous ten days. On asking some particulars as to her previous history, she said her attention was first called to the presence of a lump in her right side sixteen years before. She said it was then about the size of a hen's egg, and situated a little below the edge of the ribs. She then showed this small tumour to Mr. Mercer, of Wadhurst, and he advised her to leave it alone as it did not pain or trouble her. Its increase in volume was for years exceedingly slow. She menstruated regularly to the end of her fifty-first year. With the cessation of the catamenia, the swelling, as she termed it, rapidly became larger. During the interval between his first and last visit it became fully one-third larger. Before her death it had acquired the dimensions of a huge nodulated irregular mass which could only be judged of as weighing several pounds. Its inelasticity and stony hardness formed a characteristic condition. She lost flesh and strength, and became enfeebled and broken down. The prominent symptoms immediately preceding her death denoted marked hepatic derangement. Vomiting came on, and she threw up several quarts of dark, highly offensive semi-fluid matter, which twenty-four hours before she died had a stercoraceous odour. There was no intestinal obstruction, as the action of the bowels was never suspended.

The *inspection* was made forty-eight hours after death, by Mr. Henning and Mr. Lammiman, myself having kindly been asked to attend. On freely opening the abdominal cavity, a large, irregular, and an uneven mass was discovered. It was pale and fibroid-looking as it entered into, and seemed to have greatly supplanted, the hepatic parenchyma. On free sections being made, large loculi—or rather caverns—were discovered, and these were filled with pints of transparent, straw-coloured, and glaisly fluid. The same anomalous product had incongruously welded together, and displaced the other viscera. Rocky, indurated lumps were cut out which had all the appearance of those huge concretions which are met with in oriental cancer. It was regarded as a malignant product of the scirrhus-alveolar variety, which had attained very unusual dimensions.

CASE V.—I was requested to see a married lady, of whom it was reported that she had been for several months an invalid. This patient was about fifty-five years of age. Her facial aspect was peculiar; it was at once evident that she was jaundiced, but there was also with the yellowness a sort of mahogany shade. The pulse was eighty, and the tongue covered with a dirtyish white coat. The physical signs of the chest were normal, and she complained of little or no pain. The hepatic lines of dulness were manifestly extended, and the lower edge depended three fingers' breadth below the costal edge. The organ moved up and down with the act of respiration, and on careful manipulation two or three irregular elevations could

be distinctly felt. Sir William Jenner had seen her, but at that time no decided opinion as to the nature of the malady could be given. No nodosities of the hepatic border could then be felt. She had been under the care of Mr. Gifford Ransford, of Gloucester-Place. This gentleman gave the following particulars:—"The jaundice came on suddenly; it commenced with no previous symptoms, except a very slight pain at the region of the liver. The total absence of bile in the motions, and the continual presence of bile in the urine, had been constant symptoms. Great engorgement of the liver followed, and continued. The case is evidently one of obstruction, but whether from impacted gall-stones, or some organic changes, there has not been sufficient evidence to decide. The long continuance makes one fear some change may be taking place. All the ordinary treatment has been tried, and I have not thought that the promise of good from medicine was sufficiently strong to warrant the further continuance of any stronger remedy than the Marienbad water." The family, being most anxious to know my opinion of the case, in order that preparations might be made for the patient going abroad, I had no hesitation whatever in pronouncing my belief that the complaint would end fatally in the course of a short time, and that it was cancer of the liver. Dr. Quain came down to meet me in consultation, and he confirmed this opinion. This lady afterwards went to Brighton, and after a few weeks died, with all the obvious conditions of hepatic carcinoma. The points of interest were—the suddenness of the supervention of jaundice, and I have known such to be the case before. It may be that a small gall-stone, or a piece of inspissated bile, is at once arrested in its course, by thickening of the duct or by external pressure from an anomalous growth impinging upon the canal, and once obstruction being effected, the cause is not removed, and the phenomena of jaundice, clay-coloured stools, biliary urine and sickness not uncommonly follow. Her time of life, the prominences felt on the surface of the organ, which were so large and indurated, the stained conjunctivæ, the muscular wasting, the loss of strength, the anorexia, and the nausea and occasional vomiting left no doubt as to the true nature of the disease.

PATHOLOGICAL REMARKS.—In recurring to the first given illustration, it should be held in mind that there are other morbid conditions which exemplify considerable similitude to this affection. In pyæmic abscess, nodulated eminences can sometimes be felt at the lower margin; but in pyæmia the symptoms are altogether more acute, the circulation is increased, and pain, cough, and heat of skin are also generally present, and these are indications of the peritoneum being more or less involved. Jaundice may be the accompaniment from blood-lesion, or from a purulent abscess pressing upon the ducts. Murchison says that in pyæmia the superficial veins are not large as in malignant disease; nor is ascites an usual event. Spectra, rigors, perspirations, dry tongue,

and the shorter continuance of the symptoms, will aid us in arriving at a correct decision. Again, the pyæmia may have been of traumatic origin, or its primary cause may be sufficiently obvious. In tropical abscess bulging and fluctuation, rigors, hectic, and the patient's history, will point to the right conclusion. In echinococci there is far less constitutional disturbance; the tumours are smooth, round, bossy, and often fluctuating; there may be little or even no pain, and their growth is much slower than cancer. In amyloid liver, the surface is, on palpation, even; and often albuminuria, splenic enlargement, and caries are the accompaniments. In cirrhosis, the nodules are small, the tenderness inconsiderable, and ascites and anasarca generally come on, not infrequently in marked manner. Cancer of the omentum sometimes, as I have seen, fills up the abdominal cavity to such an extent, and there is such a soldering to adjacent viscera, as to render the diagnosis of hepatic disease quite impossible. Dislocation of the liver by empyema can be determined by the physical signs of the right thorax; and the objective and physical symptoms of encysted kidney are generally sufficient to clear up the question. In hepatic malignancy the indented dimpled feel of the tumours is a very trustworthy indication. In the instance now referred to, as I have above observed, the nodules were, not felt when she first came under my care. Frerichs says that, in the earlier stage of the disease, the nodulated projections are wanting. Sometimes the liver in this malady does not project below the costal arch, and no tumour can be felt. Then pain, by percussion over the thoracic wall, will be our best guide if associated with cachexia, wasting, and the other symptoms of malignancy.

Budd says, that cancer in primary or secondary form is more frequent in the liver than in any other organ; the Parisian pathologists place it as fourth on the list; and Rokitansky, as before remarked, gives its numerical relation, when compared with other organs, as one in five. The first named authority asserts that, of twenty-nine cases given by Cruveilhier, Andral, and Farre, in only three was it confined to the liver, and it is most rare. It sometimes occurs, though the stomach, intestines, and peritoneum are the chief seats of this form of malignancy. Luschka once saw nearly the whole of the liver converted into this description of deposit, and it is probable that in very exceptional instances it may be primary. That cancer should so often find its *habitat* in this viscus appears explicable, because this organ naturally receives a large quantity of blood, and its capillary circulation is slow and consequently favourable to the genesis of original cells from the plasma, or to the development of transferred germs, and because the portal blood must thither carry such germs (as pus-globules are carried) when the disease exists in the stomach or in any part of the intestinal canal; and again, the contiguity of the mamma, which is prone to the affection, is another cause tending to the same result.

The nodulated form—the tubera circumscripta of Farre, which was first correctly described by that author—in its earlier stage cannot be distinguished from encephaloma. These tubera, as in the first case given, are often only felt after the disease has for some time been established; they vary greatly in size, and Cruveilhier maintains that their magnitude is in an inverse ratio as compared with their number. They are sometimes as large as an orange or a small cocoa-nut, and even when of such volume may be homogeneous and condensed; but their internal consistency is much modified by their age, and ultimately, in most cases, central softening ensues. They are not always invested with a proper capsule, but, whether they possess a circumferential covering or not, the immediately surrounding parenchyma undergoes ultimate structural changes; the colour may be of a greenish tinge, from pressure on the small ducts, or there may be a pallor from vascular obliteration, and an excess of fat-molecules, those frequent associates of malignancy, and the evidences of a degenerate and debased metamorphosis—indeed, both Virchow and Vogel believe the rudimentary cancerous substance to be not only of cellular formation, but also a modified protein or fat. The flattening and indentation of these tumours are partly from the moulding influence of the resistive thoracic wall, and partly from central disintegration. This cupped appearance is most seen at the surface, because the product is most prone to be thrown out there, and with the senescence of the deposition there is internal decay, because the nutrient vessels centrally are by such an irregularly thrown-out formation most pressed upon. It causes, as it were, its own destruction. This softening sometimes goes on to a very great extent, when the masses may assume the appearance of abscesses, and blood-vessels may be eroded and sanguineous collections supervene, so as to resemble blood cysts. I lately saw an example of this, where bloody cysts had formed. The hæmorrhage may escape into the peritoneal cavity, where a more flagrant peritonitis and death are pretty certain to follow. This loss of consistency in the middle of the growths is analogically observed in tubercular deposit; and, notwithstanding that the one may be regarded as a veritable growth, and the other as a mal-assimilative formation, there is, in this respect, a good deal of pathological agreement. In both, there eventuate marked molecular changes. In cacoplastic tubercle, absorption renders the substance more dense and fibroid; in the aplastic product there is loss of cohesion, or vital affinity so called; and these mutations begin, first, most remotely from the surface, or, in other words, where healthy plasma first ceases to be conveyed. In cancer, the disintegrative softening commences at the part most distant from the reach of nutrient vessels. The cornea breaks up in like manner, under perverted metamorphosis, and when deprived of vitalising plasma.

The pressure and irritation which these nodulated bodies produce in the hepatic and parietal peritoneum are not such as to give rise

to flagrant peritonitis; the peritonitic inflammation has not the usual tendency to become diffuse, and it is very generally partial and circumscribed; and the causes of such circumscription are doubtless the slow growth of the tumours, the asthenic condition of the system, and the natural tendency which there is in this membrane, when gradually stretched or pressed upon, to assume the adhesive form, which form is a conservative law in the economy and protective from worse results. The peritoneum becomes thick and opaque, and its union with some opposing surface is apt to occur. The amount of serum is thus inconsiderable, because, when the viscus becomes organically affected under the general cachectic and mal-assimilative conditions, there is some correlation between the diminished volume of blood and the vascular impediment in the organs, and because the larger portal branches may to no great extent be encroached upon, unlike, as in cirrhosis, when there is atrophy of the venous capillaries, the entire venous circulation is interfered with, and serous effusion is the notable and pathologic sequence. In the account given of the inspection made in the first related case, it was stated that the gastro-hepatic omentum was studded with innumerable small, hard bodies, which were evidently canceroid; and it is quite clear, from our knowledge of the ultimate pathology of this disease, that these bodies owed their origin to the larger tumours in the liver. Cancerous germs can be transferred from one part to another in various ways: by the lymphatics; by venous radicles; by being carried along mucous membranes, as evinced by the growth appearing on the bronchi in cancer of the lung-substance; in the ureters and bladder, when first formed in the kidney; and in the rectum as consecutive of its occurrence in the bowels. They can also be transferred by the inoculative process, and too by the contact of unbroken and continuous surfaces. In the contact of a cancerous part with an adjacent and healthy structure, blastema, carrying the elementary qualities of the cancerous material, may be infiltrated into an organ or tissue, and fructify into malignant products. And we know it to be the peculiar property of cancer to conform itself to the natural character of the structures in which it germinates. The omentum being more fibrous than the hepatic parenchyma, the heterology of these bodies acquired a modification, and they inclined more to scirrhus than the hepatic tubera. They did not exemplify that reckless tendency to augmentation of volume which marks the progress of encephaloma, and in proportion as the blastema has a fibroid proclivity relatively will the growth be tardy. When these tumours are large, or numerous formed in the abdominal organs, death is in a great measure produced by pressure upon the chylipoietic and assistant chylipoietic viscera.

There are certain other facts of much pathological significance to which a cursory reference may here be made. Primary cancer, as the rule, is isolated, and, as before remarked, it very seldom occurs

in this organ, and when it seems to do so, if a careful and minute examination were made in other parts of the body, more especially in the glandular structures, the product would very probably be found. Frerichs bears testimony to its rarity, and Wilks and Moxon say they never beheld it more than twice in the liver when it could not be detected elsewhere. And when it does primarily become deposited in the hepatic parenchyma, the capsular investments readily assume the morbid change, and neighbouring organs and structures in no great length of time exhibit the same malady. Germs are carried by the lymphatic vessels and veins to a distance, and thus the lymphatic glands in the hepatic fissure, and in the anterior mediastinum, and the celiac and cervical glands become seats of malignancy, nor is it uncommon that isolated nodules of the same nature should be scattered in the lungs. Secondary cancer of the liver is more prone to be disseminated; the nodules may, however, vary from the size of a millet seed to that of a child's head, and large portions of the gland become infiltrated with the new product. Sometimes the borders are not at all defined, and there is a gradual blending with the healthy parenchyma. In using the term filtration, which is so commonly employed, it must be remembered there is not a pouring-in or superadding, as it were, of malignant material, as the cancer is a transformation of the tissue, a substitution of substance. The cancer cells are transformed hepatic cells, and there is a removal and replacement in the ultimate structure. Frerichs in the discussion of this particular question says the cancerous tissue is substituted for the hepatic cells, the morbid change in most cases originating in the interlobular connective tissue; and Murchison observes that the transition between the secretive cells of the liver and the large cells of the growth is a matter of considerable pathological interest.

With this substitution of the cancerous product remarkable changes are effected in the minute vessels and the capillary network of the diseased part, and more especially in the final terminations of the portal and hepatic veins. These capillaries become compressed, encroached upon, or abolished, whilst the ramifications of the hepatic artery become more developed, and they are seen sometimes to very numerously permeate the stroma. Wagner expresses assent to the opinion of Schroeder v.d. Kolk, that the growth destroys the capillaries of the portal vein, whilst others are, he believes, developed in connection with the hepatic artery, and empty themselves into the radicles of the hepatic vein. In certain cases this excess of arterial vascularity is very marked, and more especially in the medullary form; the nodules may be extremely injected, the blood becomes effused, often in dark collections, or it may be encysted, and the outer covering may give way, when there may be sanguineous effusion into the cavity of the peritoneum, inducing flagrant or fatal peritonitis. This kind of disposition assumed by the growth confers to it the fungoid characteristic. The

cancerous material is not unfrequently deposited on the inner surface of the portal vein, which it roughens and renders less free to the venous current; blood clots then form, and in these clots the cancerous substance is produced, and thus a thrombosis eventuates which may nearly or fully cause obstruction. In some cases a malignant clot effects blockage without the portal walls having taken on the malady, and several of the smaller veins appear as if they were stuffed with the morbid substance. Various authorities remark on the peculiar fact that the hepatic vein seems to possess an exemption from these pathological changes. In carcinoma of the stomach thromboses occur in a similar manner.

Such alterations having taken place in those parts which are diseased, congestion is the result in other parts of the viscus, and supervening on such mutations fulness and turgor of the superficial abdominal veins is very probably witnessed. The vena cava, as I have seen, may be thus compressed and the external veins be rendered extremely large and tortuous. Cancerous masses sometimes so greatly interfere with the free passage of the gall-ducts as to cause their obliteration or rupture; or the product may grow beneath the mucous membrane of the cystic and hepatic ducts, and so narrow their calibre as to give rise to jaundice in very marked degree, and, as previously observed, when jaundice comes on in this complaint it remains to the end as a permanent and characteristic symptom. The walls of the ducts are apt to become dilated and also much thickened; sometimes they rupture, when the biliary matter seems to be driven into new channels, and when merely surcharged with the secretion it may be found as a deep green limpid fluid. Not unfrequently the inner surface of the ducts in certain places becomes rough, and growths of varying sizes project into, and in greater or less degree obstruct, the passage. In the smaller ramifications there may from this cause be absolute obliteration, when small yellow masses are deposited, and when microscopically examined may exhibit foliaceous crystals of cholesterine, which has some resemblance to selenite.

In such instances of ductal blockage there are generally clay-coloured stools, and dark, often coffee-coloured, urine. The bile then becomes revulsed into the circulation, when the kidneys take on a vicarious and conservative action and eliminate the secretion from the system, and without this conservative and compensating function on the part of these organs the cholæmia might prove fatal. In the kind of obstruction now described in the biliary ducts, the gall-bladder may become enormously distended with bile, and when thus surcharged a round, smooth tumour may be felt pouching out under the costal edge, which in its contour and from its prominent appearance may bear a close resemblance to a hydatid tumour. I have before referred to the central softening in these growths, and this condition may be so extreme as to render the contents a broken-up, brain-like mass, or it may be semi-diffusent, and thus these

collections have been mistaken for abscess. In other instances the retrograde metamorphosis may extend through the whole tumour, when a crumbling, cheesy, non-cohesive substance is formed. In the vascular and sanguineous growths, there is, as the rule, a projecting of the nodules on the surface, and more especially, perhaps, on the convex surface of the viscus, which on exertion, or even spontaneously, are liable to bleed. In conclusion, it may be remarked that on the whole ascites is somewhat less frequent than jaundice; and when there is effusion into the peritoneal cavity it is generally in limited quantity, greatly contrasting in this respect with the profuseness of abdominal dropsy, when the cause is hepatic cirrhosis. Some pathologists have believed in the spontaneous cure of cancer of the liver, but this conception has doubtless arisen from their mistaking syphilomatous infiltrations, which have only of latter years been recognised, for malignant depositions.

XVII.

TYPHOID OR ENTERIC FEVER.

THE subject of continued fever is one which in recent years has had bestowed upon it much patient and careful observation. The four varieties—viz., typhus, enteric or typhoid, relapsing, and febricula—were formerly regarded under the first appellation as a generic term, and the differences which are now accounted distinct characteristics were not acknowledged. The doctrine of their identity was not doubted, and it has only been from data deduced from a very large number of cases that the questions of their etiology and pathology have been placed beyond the pale of dispute. It is very important that the views which have by so much labour been eliminated should be broadly known, because a right interpretation of the symptoms peculiar to each kind often involves weighty consequences, not only in the treatment, but in the prevention of their diffusion. Hospital physicians, and those practising in urban communities, where fevers are more rife, can at once recognise the particular species; but it must be confessed there are those in the profession whose opportunities are less ample, and who from time to time experience some difficulty touching many points associated with continued fever. With regard to the essential nature of the first three forms enumerated above, there is now no longer any doubt that they are as specifically different as are small-pox, measles, and scarlet-fever. In 1846-7, I published a series of papers in the *Medical Gazette*, founded on copious and carefully taken notes at the bed-side of more than 1,200 cases of fever in the hospitals in Edinburgh, for the establishment of the fact of the non-identity of, and other considerations connected with, typhus and relapsing fever. I then believed the enteric (typhoid) and typhus to be the same. Dr. A. P. Stewart first pointed out their pathological distinctions; and afterwards Sir William Jenner, in his able and widely-known work on this subject, finally settled the question.

The following is an example of the enteric form, condensed from the more extended report in my case-book, and I shall endeavour briefly to observe how its description tallies or disagrees with the other two named varieties.

CASE I.—On the 21st of June I was requested to see E. S., a girl

nine years of age, who was reported to be ill with fever. On the 12th she had had shivering and other initiatory symptoms. Her bowels not having been moved for three days, a mild aperient and an enema were ordered. The febrile expression was marked; in the night she had been delirious, and repeatedly endeavoured to get out of bed. The eyes were suffused, the pupils dilated, and there was exceeding deafness; she was, however, quite sensible, and correctly answered questions. Lips dry; tongue moist, centre covered with a yellowish-white fur, tip and edges preternaturally red. No affection of fauces; no pain at epigastrium. Abdomen somewhat tympanitic, and gentle pressure at the iliac fossa gave the transient expression of pain. No gurgling. Auscultation discovered no signs worthy of note, nor was there any dulness over any part of the thorax. Pulse 132, weak; respiration accelerated. On a cursory review of the case, it was evidently one of enteric fever. The small circular, rose-coloured spots, acknowledged as the distinguishing diagnostic marks of that disease, could not now, after a very careful examination, nor at any subsequent date of the illness, be discovered. The head was shaved, cold applied, and wine, beef-tea, and a diaphoretic mixture were ordered.

June 23rd.—A feculent stool followed the third dose of a rhubarb mixture. Tympanitis increased; pulse 130.

24th.—She tried to get out of bed during the night. Eyes suffused; pulse 138, but of larger volume; tongue moist and almost clean.

27th.—She is not so deaf; pulse 120; belly still resonant, and feels dry and harsh.

For some days afterwards the report of the case presents no facts worthy of relation. She slept better; tongue and lips were moist and clean; she was quite collected whenever I saw her; and the bowels were moved once a day, either spontaneously or by enemata. The urine from the first had been voided in normal quantity. Two small ash-coloured patches appeared on the mucous membrane of the upper and under lips, which readily disappeared after being touched with a piece of alum.

On July 9th the pulse counted the lowest to which it ever fell, 116; and I hoped she was now in a fair way of recovery, although she was by no means in the apyrexial condition.

On the morning of the 12th there was an increase of the febrile expression; the skin was hot and dry; the abdomen more distended; pulse 134.

17th.—The pulse had risen to 140, small and compressible; very deaf; tongue and lips moist and clean. Wine, during the last four days, had been increased.

18th.—Much worse; lay on her back, and down in bed with knees up; considerable tympanitis; tongue moist and clean; eyes blanched, and the features had begun to sharpen. At intervals complained of pain in the abdomen. Quite sensible, and answered

questions correctly. A mixture, with chloric ether, ammonia, and camphor, was prescribed, and wine and beef-tea given every hour. Pulse 144, small and thready.

19th.—Pulse 140; tongue moist; enema produced a dark feculent dejection; urine passed normally. From this time she obstinately refused to take anything except cold water. The heart's action became more and more feeble, systolic sound brief and sharp, the face more pinched, the skin cold and clammy, until she died, in the evening of the 24th, the forty-third day after the rigors, headache, and general indisposition had come on. During the last five or six days of her life there were, daily, sickness and vomiting. The pain in the abdomen was not so marked at the close as to make me suspect perforation. She sank from asthenia. There had never been the least tendency to diarrhoea, nor any loss of blood per anum. Until within a few hours of her decease she was rational; and up to the last twenty-four hours she could partially turn on the side. There was no smell of putridity, no sore or excoriation on any part of the skin, no subsultus, no picking at the bed-clothes, and the sphincters retained their functions almost to the close.

I did not press for a post-mortem examination, because it was so evident that the chief lesions would be the ordinarily-seen ulceration of Peyer's patches, and because that morbid appearance in this form of fever is now so fully acknowledged.

After a series of questions put to the mother relative to the mode of invasion, the particulars elicited were not so pathognomonic of the enteric as occur more frequently. It begins more insidiously than typhus, and much more so than the relapsing. In the latter the attack is sometimes quite sudden; a person may go to bed comparatively well, and in the morning be seized with the shivering, headache, pains in the limbs, and other symptoms. There is less dulness and stupidity in the enteric than in typhus, in which the great nervous centres seem prone to be more readily impressed, as if the poison at once affected animal life. It is quite true, however, that all forms of continued fever in the symptomatology of accession present much in common, and, under an experienced eye, it is often difficult during the first few days, or even until the rash appear, to arrive at a decided diagnosis. In typhus, the muscular system evinces great prostration, not only at the first, but throughout the disease; as a rule, the patient lies helplessly on his back. In the instance given, she could turn herself in bed, and lie on the side up to a short time previous to dissolution. Again, the intellectual faculties were comparatively little disordered. During the night there was some wandering delirium, as evinced by repeated efforts to get out of bed; but in the daytime she was up to the last quite rational. The moment I entered the room she always recognised me, and, when she could be made to hear, correctly answered questions. The deafness came on early, and it varied much; some days she was very deaf, on others slightly so. This symptom is

common to both typhus and enteric, and, regarded alone, it does not importantly affect the prognosis. Jenner has noticed that in the enteric type patients have a greater tendency to "get out of bed" than in typhus; the delirium is of a more vivacious kind; they are less easily restrained. In many cases the delirium does not come on until the second or third week; when it does in the first week, it is to be looked upon unfavourably. In typhus, it supervenes before the end of the first week, when it increases, and in fatal cases ends in coma. In relapsing fever, there is comparatively little delirium and head complication. On reference to my own account of that disease, in one table giving particulars of 450 cases, leeches were applied to the head, on the average, to 1 in 6.62; in another set of 80 cases it was a predominating symptom in the small proportion of 1 in 11.42. According to Louis, the brain and its membranes of those dying of the enteric rarely present any such marked appearance as might be deemed of potential consequence entering into the causation of death. To those who have had considerable experience in morbid anatomy, it is well known that the encephalic mass gives little explanation of the essential nature of continued fevers. A small amount of sub-arachnoid and ventricular effusion, a pinkish blush of the cortical substance, or it may be a few puncta in the centrum ovale, constitute often the entirety of morbid phenomena, and I have repeatedly examined this organ when it evinced no lesion. Even coma may not be traced after death. There is no doubt that the views enunciated by Clutterbuck and those professing similar opinions—regarding fever to consist of inflammation of the brain—led to much mischief in practice, and that a more correct pathology has been succeeded by a more successful mode of treatment—viz., that treatment which as far as possible dispenses with depletive measures, which is more expectant and conservative in its aims, and which by having a just relation to a set of morbid actions not primarily located in any single organ or separate tissue, but pervading the entire organism, opposes asthenia, and which acts according to the Cullenian maxim of "averting the tendency to death." Acute diseases, and more especially fevers, have, from some subtle and inexplicable cause, become less sthenic in their nature, demanding remedies which in previous years were accounted inapplicable or decidedly prejudicial.

Those organs and surfaces which are of an eliminative, a depurative, or defecating character—those emunctories and outlets whereby the products of organic waste and effete matters are carried off, are precisely those which are most liable to become affected in the progress of fever. That poison which by a most rapid multiple has so vastly increased as to contaminate the whole of the circulating fluid, in obedience to certain vital laws inherent in the organism, by such channels becomes expelled; hence, according to the power of such agent, the excess or defect of function of such organs and surfaces; and thus it is that the skin, the mucous membranes, and

the parenchyma of secernent viscera more especially manifest the effects of the specific poison. Ancient theory and every-day facts convince us of those conservative qualities which the system possesses, whereby it essays to eject what it cannot assimilate, and to get rid of such noxious matter as it may have contracted. In the exanthemata, the skin and the mucous membranes of the air-passages are the chief seats of its determinations; in enteric fever, the pustulation is in the digestive tube, mainly in the ileum; in typhus, the mulberry rash evinces an effort made at the superficies to throw off the poison; and in relapsing fever, the powerful diaphoresis, which so frequently at once resolves the fever, inculcates the same doctrine. It now being conceded that the three eruptions peculiar to the respective types of continued fever are as pathognomonic of those varieties as are the eruptions in the exanthemata, properly so called, it would seem that it is merely a necessary distinction on the part of systematizers and compilers of nosology, whereby they are differently arranged. They all have many features in common; they all originate from peculiar morbid poisons, requiring a greater or less period of incubation; they all pass through a certain train of febrile phenomena; and in all the great centres of animal and organic life are in varied degree affected. Again, there are many points of resemblance in the complications which arise, in the demand of treatment, in the sequelæ, and in the phenomena of the fatal issue. If we were to make a hasty comparison between small-pox and spotted typhus, how many characteristics they manifest of a like nature, still unquestionably caused by poisons, with which like only produces like. Both originate from peculiar poisons, are contagious, require a certain period for development, are diseases in which the prime agent specially operates upon and multiplies in the blood; in one the eruption may be looked for on the third, in the other on the sixth day; in both are all the pyrexial symptoms, as a quick circulation, high temperature, furred tongue, anorexia, diminished secretions, and a great impress is made on the nervous system; in each organic complications of the inflammatory kind may arise; there is delirium and often coma. In the first named form, death mostly takes place on or about the eleventh day; in typhus mostly on the fourteenth, and both may have sequelæ attacking the same organs and tissues. And similar comparisons might be drawn between any two types taken from continued fevers and the exanthems. Although human reasoning cannot say why it is that in one variety the pustulation is in the intestines, in another in the skin, yet accumulated observations have long shown, that between the skin and the mucous membrane of the digestive tract there is a peculiar sympathy, and that between the enteric and variolous phenomena many of the fundamental symptoms exemplify no slight or casual features of resemblance. Andral named the ulceration of the ileum in typhoid, exanthema of the intestine.

Of the essential difference between relapsing and typhus fevers I can speak with much certainty. Many years ago I maintained from very elaborate data their distinct essence, and such doctrine still holds good. In more than 1,200 cases I never saw typhus and relapsing blended. The infection caught from one fever never produced the other. Like always produced like in a multitude of instances. I have given in my papers thirty-two cases, in which the two forms succeeded each other within a short space of time. Seventeen out of the thirty-two who had passed through the relapsing contracted typhus during convalescence, or within the brief period of three months. The proofs of the non-identity of their essential cause were as clear as the common-sense proofs we have, and as practice ever tells us, of the non-identity of small-pox and scarlet fever. Typhus, typhoid, and relapsing fever are etiologically and pathologically separate and distinct entities.

With regard to the moisture and cleanness of the tongue, as reported, Louis notices the same. In the forty cases which he gives, in one-half it remained moist. In typhus, it sooner becomes brown and dry, and sordes are more common. In the relapsing, it is much furred, but moist. There was tympanitis at my first visit. This symptom is, of course, from gas in the colon; and when liquid is there also, gurgling is heard. The absence of diarrhœa accounts for the gurgling never having been recognized. In the enteric form diarrhœa is well-nigh always present. It occurred in 37 out of the 40 cases of Louis; and Tweedie, Jenner, and Wilks regard its presence as the rule. In typhus, meteorismus and diarrhœa are rare; the belly is generally flattened or drawn in; and harass of the bowels is not usual, but an incidental and seldom-observed circumstance. In the relapsing fever, in 450 cases I found diarrhœa to average 1 in 6·25; but 1 in 1·65, or 10 out of every 16, had urgent nausea or vomiting. When vomiting comes on in the latter part of enteric fever, ulceration of, or a changed condition in, the mucous membrane of the stomach may be suspected. According to Carpenter and other advanced physiologists, the intestinal glands are outlets for the impurities of the blood. If such be the fact, the proneness of the agminate glands to disease in the enteric form can better be accounted for. Rokitansky gives an elaborate account of the pathological changes undergone by these organs in the fever considered. He says there are four stages—one of blood stasis or congestion, a second of infiltration of deposit, a third of softening, and a fourth of ulceration. The lower third of the ileum, and around the cæcal valve, are the parts most affected. I have made many examinations of the digestive tube of patients dying in fever. I never saw ulceration in the intestines of those who died from typhus or the relapsing forms. The diarrhœa which ushers in the close of phthisis is accompanied by ulceration of Peyer's patches. I was much struck with the general resemblance of this patient to the appearance of those dying in phthisis. A casual observer might

almost have mistaken her affection for that complaint. It is seen that the pulse never fell to the non-febrile standard. From first to last, the skin was never moist, but of dry, harsh feel, and of exalted temperature. The pulse was one day 116; it varied, seldom being exactly the same on consecutive days. Irregularity of the pulse is pathognomonic of the enteric. In typhus, when the pulse reaches 130, the case is generally fatal. In relapsing, the pulse might be exceedingly high without indicating danger. The death of E. S. occurred at a protracted period—the forty-third day. Of twenty-five fatal cases given by Jenner of typhus, nine died on or before the fifteenth day—not one after the twenty-second. The same authority gives the twenty-second as the day mostly fatal in typhoid (enteric), and the fourteenth as mostly fatal in typhus. In idiopathic peritonitis, the intellectual faculties keep unclouded almost to the last. The great sympathetics are potently affected, and the proximate cause of death is increasing debility of the central organs of circulation. The fatal phenomena are exerted on the action of the heart. In the enteric fever, the decrease of power in that organ demands watchful attention; the patient sinks from asthenia—hence the imperative need of stimulants.

Some writers on fever have maintained, that the enteric is always intimately associated with some local cause. The germs of the enteric are not always conveyed by the drains, but very commonly by contaminated water. Noxious effluvia and emanations do not always produce it, but may in high concentration. I may here mention that a nightman of this place informed me he had been sixteen years thus occupied, yet never had fever. And again, he added that he could instance the names of a dozen other men who for long periods had thus been employed, but he never knew one to have fever. No one, however, can gainsay the fact of bad drainage being one main element entering into the causation of fevers. The family of the deceased whose case I have related came to reside at Tunbridge Wells, six weeks prior to her attack. The cottage in which they live is one of a row of new, well-built houses, thoroughly ventilated, and situated in an airy, open, dry, well-drained street. The rents vary from £11 to £12, and none of the occupants can be classed with the poor. I was astonished to hear of the many cases of fever which from time to time had occurred in these houses, and felt certain of some local cause. I found that at No. 1 a family had resided five years, and four of the inmates had had fever. At No. 2 there had been six fever illnesses in nine years. At No. 3 the husband had fever some few years ago. At No. 4, where the deceased died, two other cases occurred. At No. 5, a girl had had fever, and it was reported their predecessors had it. At No. 6, I could hear of no case. At No. 7, a girl of sixteen, and a boy of twelve, had “low fever;” and a woman of twenty-six had “typhoid fever.” I was told it had often been remarked that “fresh comers” took fever. Behind the building are

seven small strips of garden ground, and in each a privy. From the privies runs a deep drain, through a sandy shale; and within a few feet of this drain is the pump-well. The well-water had long been complained of, and, after heavy rains, it was said to have a bad taste. The town surveyor, who made an inspection, told me he believed it very probable that the matter from the drains might percolate into the well. He recommended the well to be filled up. In the next set of premises is another well, supplying two other houses. I made inquiries, but could not hear of any inmate ever having fever in these two dwellings; but they always used the water from their own pump, and never from the pump common to the seven houses. The above recorded facts prove that impure water when drunk is a most common cause of the typhoid type.

The chief cause of the diffusion of typhus is destitution; for proof of which I would refer the reader to the records of Scotch and Irish epidemics. In relapsing fever, of 436 cases, 81 were in partial work, and 301 were destitute. The relapsing fever cases in Edinburgh and other large towns in Scotland were in a less relative proportion in the ground-floor houses, whose occupiers were mostly little traders, and in comparatively better circumstances, though, of course, nearer the drains than those above them; but in the upper flaps there was by far more poverty, and, consequently, far more fever, as will be fully told in the next article.

None of the various types of continued fever are characterized by greater irregularity and anomalies, both in the mode of accession and during the progress, than the enteric; and this discordance of the phenomena, more especially at the outset of the attack, should be held in due consideration, because the disagreements and semblances which it assumes may be followed by error in diagnosis, and consequently by wrongly directed or absolutely mischievous treatment. Again, the etiology is frequently surrounded by such conflicting facts, and with so much irreconcilable evidence, as in no slight degree to add to the dubiousness and difficulty which even those of the greatest experience often entertain at the commencement of the affection. Sometimes five or six, or even six or eight, days may pass before the physician can confidently pronounce on the real nature of the malady. A correct opinion sometimes cannot be given until the advent of the characteristic spots. Such being the case, it is obvious that, during the initiatory stages, much caution should be observed by the practitioner before he commits himself to a definite declaration. He may be asked whether it be or be not specific fever in the first days of the complaint, when no decided reply can consistently be made; and, if a rash and venturesome answer be returned, there is the chance of being wrong, and thus, it may be, of leading to misunderstanding on the part of the patient's friends, and to the loss of professional confidence. The public are little prone to make allowances for those

mistakes and misadventures which must of necessity from time to time occur in a science so inexact, where, in examination, underlie so many sources of fallacy, and where there is so much room for individual theory and speculative deduction, as in the science and practice of medicine; and hence it is not well, in febrile diseases generally, to give statements which cannot be borne out by obvious reasoning and the unassailable testimony of ocular demonstration. The first symptoms of enteric fever may closely look like one thing, and soon they may simulate another. We are sometimes called to see cases which appear to be nothing more than a mere biliary attack; purgatives may be given, under the hope of a speedy convalescence; and, instead of improvement, the general disturbance in the system becomes more proclaimed; the looseness of the bowels turns to a severe or an uncontrollable diarrhœa; the pulse becomes quick; there are headache, restlessness, and insomnia; the abdomen is rendered tense and resonant; and the temperature may be three or four or more degrees above normal. The idea of the disease being a mere biliary attack begins to be rendered very doubtful, and fears of a graver affection are entertained. The aperients or purgatives to carry off the bile may unfortunately institute intestinal irritation, and this kind of mischance may occur when the patient is in the best of hands. The converse is sometimes presented, when we dread the accession of specific fever, and the disorder proves to be of transient character. I was requested to see a lady between thirty and forty years of age, who for some short time previously had not been in good health. It was reported that she had sat in damp shoes, and had taken cold, and had had rigors. When I saw her, she was labouring under diarrhœa and sickness; she looked flushed and feverish; complained of headache and aching in the limbs; the tongue was coated with a white moist fur; the pulse was 120°, and the temperature in the morning 102°. It was also ascertained that she had taken some indigestible food; but, on a general review of all the particulars relative to the case, there arose in my mind a great suspicion of fever. She was ordered the usual remedies for the sickness and diarrhœa, and strict attention was given to the kind of nourishment allowed; and in a couple of days the pulse fell to 76, the temperature a degree below the natural standard, and she expressed herself as being almost well. In some exceptional instances, a person may have enteric fever—in short, gastric or intestinal irritation from the beginning to the end of the disease; he may, perhaps, have only complained of shivering and headache, of the loss of appetite and disturbed sleep; he may not have been confined to his bed or room, and even may have pursued his occupation with little interruption. Or there may be for two or three weeks a comparatively trifling indisposition, accompanied with moderate looseness of the bowels, and the affection may run its course without its specific qualities being recognised. I have known it regarded as erysipelas, when the

erysipelatous inflammation was merely the incidental accompaniment of the foregoing and primary disease. According to the experience of Louis, Chomel, and Forget, erysipelas is the association in about one case in twenty. It may be in one or other of the limbs, or in the head and face. I have known a contusion on the head, received during the accession of the primary fever, to become the exciting cause of this complication in very severe degrees, when the super-added erysipelatous symptoms have very greatly masked the primary and underlying complaint.

I have known typhoid fever to put on a very close resemblance to delirium tremens; and sometimes, when the patient has been of intemperate habits, there may at some part of its course be the greatest difficulty in deciding as to which of the two affections has to be treated. There will be the same kind of rambling incoherence, the restlessness, the wakefulness, and the frequent attempts to get out of bed, which are the common symptoms of acute alcoholism; or mere mania may be simulated. I saw with Dr. Ievers of Tunbridge an illustrative example of what is now stated. A young woman, a domestic servant, was taken ill at Hastings, and, in the course of a few days after the commencement of her indisposition, she was sent home in a fly, a distance of nearly thirty miles. Immediately after her arrival, she became quite maniacal; she talked incessantly, in that garrulous and unconnected manner which is characteristic of insanity. For several days, there was no change in this peculiar and prominent symptom; and, as there were no other very marked features in her case, it had become a question—and a very reasonable question—on the part of her friends, if the asylum were not the most proper place for her reception. There was one symptom, however, amongst much conflicting evidence, which in itself was a significant fact: the temperature was three degrees above normal. This gave a very strong probability of enteric fever. The case soon proved itself to be that disease, and the patient made a full recovery. In uræmia, and when the blood-poisoning consequent on renal disease has for a time gone on, typhoid conditions are often assumed which render the case most perplexing. To say whether we have an example of uræmia with typhoid symptoms, or uræmia as a complication in the course of an enteric attack, is not unfrequently most difficult. In some instances, the thermometer can alone solve the question. Upon the single fact of the degree of temperature we may have to make the decision. Every practitioner is aware of the resemblance between phenomena of typhus and typhoid pneumonia; and that pleurisy, laryngitis, and diphtheritic forms of inflammation are sometimes associated with the disease now considered. Intermittents and remittents may at the first appear to be present, and the morbid phenomena pass on into enteric fever. A mere dysenteric affection may be likened, and a week pass before continued fever is recognized; or a choleraic kind of condition may at the first be presented, more

especially during the summer and autumn months, when gastric and intestinal complaints are apt to prevail. Again, acute rheumatism is sometimes so simulated as to render the correcter diagnosis impossible. The following instances may here aptly be cited.

CASE II.—Mary T., aged sixteen, a maid-servant out of place, was attended as an out-patient by the then house-surgeon, Mr. Benjamin Rix. At the beginning of her illness, she showed the ordinary symptoms of rheumatic fever. She had in a marked manner muscular and arthritic pains; she could not turn in bed, and screamed with pain. The elbows, wrists, knees, and ankles became swollen; and there was some præcordial uneasiness, with a systolic *bruit*. Quick pulse, exalted temperature, and powerful diaphoresis, added their testimony to the rheumatic notion of her case. She was—and, as it was thought, very properly—taken into the Infirmary, and placed in a general ward. Immediately after her admission, the articular swellings began to decline, the case proclaimed itself beyond all doubt enteric fever, and she died nine days after coming into the institution.

CASE III.—George B., a powerful man, twenty-eight years of age, a labourer, was taken ill in November, and was attended as an out-patient by the house-surgeon, Mr. Cleland Lammiman. When first seen, he had all the symptoms of acute rheumatism. He then complained of great muscular and arthritic pains, and all the large joints were red and swollen; he had powerful sweats, with high and scanty urine of acid reaction; and his illness was very naturally considered to be rheumatic fever. On the 17th of that month, he was taken into the hospital, and placed amongst the other patients. In the course of a couple of days, the definite characteristics of enteric fever were presented; the pulse, temperature, spots, tympanites, decubitus, delirium, and other distinguishing symptoms, dissipating any doubt as to the nature of the ailment. The disease ran a marked and severe course, and for some days his recovery seemed exceedingly doubtful. He was discharged from the Hospital after having been an inmate nine weeks.

CASE IV.—A married lady, fifty-eight years of age, had more or less been under my care during nearly a year. She had loss of power in the right arm, and there was some feebleness in both her legs. She had been for some time before I saw her in declining health. She was pale and anæmic, had lost flesh, and the digestive organs were apt to be disordered. She had taken ferruginous, phosphoric, and other tonics, with cod-liver oil; had been ordered a carefully selected diet; and electro-galvanism had been applied to the arm. Under this treatment, there was marked improvement. In the latter part of January she took an hour's drive in an open carriage. After this, she felt stiff in her limbs, as if she had taken cold. She had pains in the back and arms and legs, felt feverish, and had some degree of headache. She kept her bed for two or three days, under the hope that she would be better

of her cold. I first saw her on February 3rd. The pulse was then quick, the temperature above normal, and all the large joints were painful and slightly swollen. After two days, the elbows, wrists, hands, knees, and ankles, were red and more swelled. She had drenching acid sweats, and the urine was of acid reaction; the tongue was coated, and the bowels were confined. The muscular pains were so extreme, that she could not turn, and hardly move, in bed. Slight jaundice supervened, and the swelling in the joints *rapidly* subsided. Though I had not hesitated to tell her friends the illness was rheumatic fever, which at first I fully believed it to be, before the end of the week from my being called in, I had to very importantly modify such opinion, and declare the presence of a grave attack of enteric fever, and to which I added a foreboding prognosis. Her age, her previous ill-health, and the severity of the symptoms, warranted such way of speaking. She died on the seventeenth day of the month, or at about the end of the third week of the disease. There were all the cardinal characteristics of specific fever, notwithstanding that this complaint had been at the outset perplexingly mixed up with those phenomena which are regarded as the essential qualities, objective and subjective, of acute rheumatism.

In a conversation with Sir William Jenner, I recounted particulars of these exceptional cases. He told me, that he had seen two examples precisely similar, in which, during the commencement of the affection, the name of acute rheumatism could only be given to the complaint, but which went on into veritable enteric fever. Murchison, in the last edition of his work on "Continued Fevers," says: "In several instances, I have known the pains in the limbs to assume a neuralgic character and prevent sleep, while in others they are articular, and the case at first simulates rheumatism." Now, in acute rheumatism, rapid subsidence of articular swelling is often succeeded by cardiac implications, a circumstance which did not occur in the foregoing examples; and, when acute rheumatism runs its common course, enlargement of the joints may, and mostly does, continue for weeks when the joints are swelled. Garrod says that, in such cases, a large percentage have inflammation of the endocardium or pericardium. It is true that in some cases of acute rheumatism typhoid symptoms may be presented; but there are negative facts which distinguish such instances from the specific disease, and it must be held in remembrance that in fatal examples of rheumatic fever, death eventuates, not merely from the serous covering within or without the heart being inflamed, but from the absolute pathologic changes which have taken place in the walls of the organ, whereby its contractile and expansive functions become affected; or it eventuates from cerebral disease, which often is dependent as much upon failure of heart-power as upon alteration in the circulating fluid. When the brain-lesion is the proximate cause of a fatal issue in acute

rheumatism, and when typhoid appearances are recognized, certain negative facts come to our aid in drawing the distinction between such condition and the specific disease. There may be no diarrhœa, but a tendency to constipation; no pain on pressure, or gurgling in the right iliac fossa; no tympanites; no eruption; and the clinical history may differ from the clinical history of continued fever. The patient's previous habits, the climatic and other influences to which he has been exposed, the kind of illnesses through which he may have passed, and certain constitutional tendencies, will often markedly modify the disease in its progress, and, it may be, importantly determine the kind of complication with which we have to deal.

CASE V.—I have before incidentally remarked, that fever of the periodic type may at the outset seem to be present, and the symptoms then assume the enteric form. I was requested to see with Mr. Marsack an illustrative instance of that which is now maintained. A gentleman of powerful frame, in robust health, and fifty-nine years of age, visited Rome in the early spring. After a sojourn of three or four weeks he contracted the endemic, and as soon as he was able, returned home. He then gradually improved, and, for a short space of time, he appeared to have become free of the complaint. In the latter part of April he threw off his upper coat and took cold. The rigors, headache, quick pulse, heat of skin, and the usual febrile phenomena were again apparent. The drenching sweats at regular intervals, and the clinical history, very naturally made his medical attendants pronounce the affection to be a return of the Roman fever. Sir William Jenner, who saw the case with Mr. Marsack and myself, at his first visit, thus regarded the ailment. In a short time the complaint gave abundant and unequivocal evidence of enteric fever. The case ran a protracted and severe course, and with its progress the sweatings ceased; and it was then only characterized by those broad and distinguishing phenomena which mark so significantly this type of continued fever. The diarrhœa, the distressing tympanites, the grave amount of pneumonia, and protracted delirium, for long rendered the issue most doubtful, and more especially when the patient's age was taken into account, and it was evidently only through a fine organism and previously unimpaired health that the case did not pass on to a fatal termination. The disease seemed insensibly to change from the periodic to the enteric type. Sir William Jenner had seen the same kind of example before.

CASE VI.—On July 3rd, a young gentleman, twenty years of age, consulted me for cough, loss of flesh and strength, and a general condition of ill-health. A London physician had sent him to Tunbridge Wells for change of air. He was thin, pale, and anæmic, and evidently of exceedingly nervous and excitable temperament. On examination, it was clear that he was labouring under

pulmonary phthisis in the first stage. About midnight on the thirteenth of the same month, I was hastily summoned to his bedside. He had gone to sleep but awoke suddenly, and immediately coughed up blood, and he lost a considerable quantity before this attack of hæmoptysis subsided. In the course of two or three days, the breathing became exceedingly accelerated. On the twentieth, I had no hesitation in pronouncing the illness that of typhoid fever. The case soon assumed the gravest symptoms. Diarrhœa, tympanites, subsultus, extreme prostration, dry tongue, and delirium, were the objective indications of its being an attack of much virulence. The pulse ranged between 120 and 130, and the respirations were so quick that the breathing became panting. During the first eight days of August, the third week of the fever, the pulse varied between 116 and 132, the temperature from 100·2 to 104 and 106, the respirations were never during this time less than 48 in the minute; and on August 3rd, the day on which the temperature was 104, the pulse was 132, and the respirations so high as 68 in the minute. The temperature within a few hours of his death, which occurred on August 9th, fell to 100·4, but the pulse kept up to 132, and the respirations at 50 per minute. For many days the jactitation was incessant and in extreme degree, nor do I remember having ever witnessed greater jerking movement in the limbs than in this patient. Louis, Jenner, and Murchison regard muscular tremors and agitation as being frequently of fatal import. The excessive respiration above recorded had doubtless much reference to the tubercular obstruction which already obtained in the upper third of the left lung, just as we notice quickened breathing in intercurrent pneumonia; the pulmonary substance becomes engorged, and the heart is stimulated to increased exertion. In this young gentleman, however, there is no doubt that an overdose of the specific poison was also a cause of this abnormal respiration, as it was evident that the great nerve-centres were from the first in marked manner affected. According to Forget, phthisical subjects very rarely contract enteric fever; indeed, this authority regards phthisis as protective from enteric infection. Louis saw four fatal cases of enteric fever, in which tubercles were discovered in the lungs.

In the last cited case, the hæmoptysis was a very unfortunate event, and more especially in a person who was already debilitated by disease. It was presumptive that the malady would, after the large amount of blood which he lost, assume the state of prostration. I may here for a moment compare these three particulars, namely, the pulse, respiration, and temperature, with the notes of another case of this complaint which were taken daily throughout the disease, and where it ran a moderately severe course.

CASE VII.—On February 22nd, I was requested to see a single lady, aged thirty-five, in the country, who had just returned from the north of England. It was reported that, ten days previously to her becoming

ill (dating that illness from the first accession of rigors and headache), she had entered a cab, that the smell in the vehicle had almost made her sick, and she fancied she had never been quite well from that moment. On my first visit, I gave the opinion that the complaint was the beginning of typhoid fever. The pulse was 120, respirations 22, temperature 101·2. Diarrhœa, tympanites, prostration, and the eruptions, soon proclaimed the nature of the malady. The right lung in its lower half or more was affected with a low form of congestive pneumonia, which, however, became amenable to the ordinary remedies. During the subsequent twenty-eight days the pulse never exceeded 122; the respirations were only once so high as 30, which was at the end of second week, at the time when the pulmonary complication was most pronounced, and the temperature attained its maximum degree at the same time when it reached 103·4. During the first week, the highest pulse was 122, the highest respiration 26, and highest temperature 102·2. During the second week, the highest pulse was 116, the highest respiration 30, and the highest temperature 103·3. During the third week, the highest pulse was 108, the highest respiration 24, and the highest temperature 103·3. And, during the fourth week, the highest pulse was 100, the highest respiration 24, and the highest temperature 100·2. Now in Case 6, less of breathing space in the left lung was encroached upon than in this lady, whose right lung was obstructed over from one-half to two-thirds of its course; hence, the very excessive breathing in the young gentleman was doubtless mainly referrible to the virulent qualities of the specific poison in an organism which seemed resistless against its effects. It may be regarded as a rule in this form of fever, that in all instances in which the respirations exceed forty in the minute, there is acute—and it may be, as now proved exceptionally, chronic—lung-disease. The respiratory movements increase relatively with the advance of the fever, or, in other words, in proportion to the amount of general prostration. When the breathing is of the panting description, so far as my own experience goes, there are generally grave doubts as to the result, such examples frequently going on to a fatal termination. Again, in the instance now considered, illustration was forcibly given of the extreme severity of the case by the *sudden* rise and fall of the pulse, the disturbance in the pulse-respiration ratio, and the extreme subsultus and jactitation. These conditions alone ominously pointed to a fatal ending.

CASE VIII.—I was sent for, early in the morning of March 11th, to see a gentleman, forty years of age, who was reported to be labouring under a severe biliary attack. When I reached the house, he was dressed and walking about the room. He told me he had diarrhœa and felt exceedingly sick, and he had just vomited some greenish-yellow glairy mucus. I was informed that he had come from the Isle of Wight on the first day of the month, and that he had never seemed well since his return home. He had gone out

every day during the previous ten days before I saw him, but he had felt chilly, complained of weakness, headache, loss of appetite, and inability to sleep. At my first visit, the pulse was 120, the skin harsh and dry, the tongue was coated in the centre and red at the tip and edges. I was particularly struck with the facial aspect, as he looked pale and sunken in the face. I requested him to go at once to bed. I told his wife I feared her husband was in a serious illness. I then thought the case typhoid fever. He was ordered a mixture, with small doses of potash and hydrocyanic acid to be taken in effervescence, with a few grains of citric acid, and requested to have some iced brandy-and-water, and, as soon as his stomach could retain anything, to have at short intervals strong cold beef-tea. In the evening, the sickness had in a great measure subsided, but he looked hot and flushed. The tongue was dry, and the countenance had a markedly febrile expression. The pulse was 120, respirations 26, and temperature 104. On the following morning he said he was no better. I found he had had a very restless night, and had wandered. The face was flushed, and the eyes looked glassy and wild. The skin was hot and moist, and he had perspired a good deal. On the first examination of the thorax, there was some dullness at the upper and posterior part of the right lung, and this increased. The abdomen was tympanitic, and two rose-coloured spots were detected. He did not complain of pain or pressure at the right iliac fossa, nor was there any gurgling. The bowels were loose, and the excretions dark and biliary. Pulse 128, respirations 28, and temperature 104. He was ordered an astringent mixture, a large poultice to the back of the chest, port wine, brandy, strong beef-tea, and calf's-foot jelly. In the evening there was no improvement. On the 13th (morning), the symptoms were much the same; pulse 120, respirations 26, temperature 102. In the evening, the temperature was higher still by two degrees. On the 14th, he was much worse. Sir William Jenner saw him with me at eleven o'clock in the evening of that day; he then lay in a semi-unconscious state, bathed in perspiration, the pulse being 128, small and compressible, the respirations 28, and temperature 104. He gradually sank, and died three hours after our consultation.

There were certain points of interest in this case which exemplify what has already been said relative to the peculiarities of typhoid fever. Its accession was, by the patient and his friends, considered as merely a biliary disorder. He was taking his walks and going about in the town and neighbourhood only five days before he deemed it requisite to have medical advice, and, too, before his death! His downward progress after I saw him was remarkably rapid; and, as Sir William Jenner observed, the illness was characterised by a degree of virulence which rendered all remedies quite inoperative. In this instance it was precisely that which we have sometimes to witness in scarlet fever and diphtheria, when the symptoms assume a malignancy and violence of character, and the

system succumbs in despite of every effort and every agent. Another fact worthy of note is, that as an incidental circumstance it would seem developed in his system. A few days before the accession of the first symptoms, he slept in a room in which there was an escape of gas. He said he "awoke in the morning almost poisoned with the gas, and had never been well afterwards." It was also subsequently stated, that the house in the Isle of Wight where he had resided, was a new, excellently drained house, and the water used was regarded as exceedingly pure. In this instance, the poisonous effect of the gas was a main factor in the development of the specific symptoms. There were no cases of typhoid anywhere in the neighbourhood of the house which he had left, nor, it was believed, in that part of the Isle of Wight whither he had for a few days gone to sojourn. After much inquiry, the etiological conclusions were not a little favourable to the doctrine of autogenesis. In the fourth case, before given, this view of the primary cause seemed to receive, after much deliberation, considerable confirmation towards such way of thinking. This lady lived in a recently built house, in grounds which quite separated it from other residences. Her husband, who superintended its building, had paid utter attention to the drainage and other sanitary arrangements. The closets were constructed on the Nightingalian principle, now adopted in all newly constructed hospitals, whereby the closets are entered by a small lobby with windows opposite, thus ensuring through ventilation; and when I accompanied him over the house, all the traps and drains seemed in perfect order. On account of this lady's indisposition, they had for long received no visitors, and for months had remained at home. It was consistent with my knowledge that there was not another case of typhoid in the district. The water which the family drink and use for all culinary purposes is from a well eighty feet deep, and quite remote from the house or any other building, and where its contamination is simply impossible. She took a drive in an *open* carriage, caught a chill, and this seemed the only cause and forerunner of the fever.

In the case of another lady, which occurred some time ago, which passed on to a fatal termination, and in which I took a sad and mournful interest, I could not, after much subsequent and painful investigation, discover the ordinarily recognised cause of the disease. Without entering into the details of the facts, I have always been driven to the conclusion that a repetition of family bereavements and the fatigue and watching during an illness, produced so much depression and exhaustion in the system as to develope in the organism those conditions which end in the more ostensible phenomena of the distemper. Previously to that time, I had always held to the doctrine of an imperative necessity for the specific poison being imported into the body. My subsequent experience, from certain seeming illustrations and circumstances, has gone to confirm the belief that, under special and peculiar conditions, enteric fever

can become instituted in the system without any external agencies other than such common causes as give rise to that lowered tone of vitality which favours the springing-up within itself of the morbid phenomena in question. In my early life, and prior to the time when the now recognised types of continued fever were known as they now are known, I can call to mind sporadic cases which, from time to time, occurred in an agricultural and very sparsely populated part of the country, where the theory of a specific poison being superadded to other elements in the causation is hardly in any wise tenable. And I feel persuaded that the correct solution of these still contested and debatable questions relative to the etiology of enteric fever, mainly lies not amongst the physicians and practitioners in the metropolitan cities and large towns, but rather with those whose powers of observation are confined to small and separated communities, such as in villages and rural districts. I have often thought that if this subject, and kindred inquiries, were to be broadly taken up by the rural members of the British Medical Association, such an amount of information and facts would be elicited as to finally settle many points still uncertain and held in disputation. Such etiological researches in urban centres and dense populations are liable to be vitiated in innumerable ways. Doubtless, typhoid fever can, as the rule, be traced to bad drainage, polluted water, and, in more limited degree, to contagion; but I also now firmly believe, as asserted above, that it may occasionally with truth be referred to an autogenetic origin. In medicine, as in theology and politics, it is now found there is need, in many hitherto accepted propositions, of broader survey and greater liberalism of thought; and that many dogmas and arbitrarily demarcated definitions must be subjected to the test of a sounder reasoning and deeper scrutiny.

The late Dr. Baylis, the able and indefatigable Sanitary Inspector for West Kent, when I asked his opinion relative to this my belief in the autogenetic doctrine, assured me he was becoming more and more a convert to this theory. He told me he had been in various parts of the county to investigate into the cause of several sporadic cases of enteric fever, some of which were in peculiarly isolated positions; and, after much labour and inquiry, he could only arrive at the conclusion that all the arguments and all the circumstances excluded the notion of an imported or resuscitated specific poison. In three instances, the history, the surroundings, and all the particulars, went only to the confirmation of such way of thinking; but in all the examples were present those ordinary and acknowledged conditions which favour the development of typhoid fever.

In saying a word as to *treatment*, the great principle to be observed is the administration of those agents which best promote the elimination of the specific poison and those products resulting from a retrograde metamorphosis of the nitrogenous elements of the blood and the tissues. Hildebrand long ago declared the aphorism,

to which now all authors agree, that continued fever can neither be cured nor yet cut short. So far as in our power lies, to direct its course, maintain the general strength, and to treat intercurrent complications, are the requirements; nor is a little in the accomplishment of success dependent upon good nursing and the observance of nicely regulated regimenal rules. To guide the ship through, and not attempt to subdue the storm, was the figurative language but apt illustration of Pitcairn. When the febrile process once becomes established, it will inevitably pursue its course. A correct knowledge of the duration of the disease is all-important; and not one of the least of those practical improvements resulting from the precise definitions which we can now give of the three types of continued fever is, that in any part of the febrile attack we can look with more certainty ahead, and judge with not a little of certitude of what we are to expect. Prior to the now demarcated distinctions in the pathology and diagnosis of these respective types, there was much confusion and not a little of guessing. Events now can be anticipated. The primary lesion of the bowel in the one form, marked affection of the great nerve-centres in another, and diaphoresis and relapse in a third kind, did not receive that special attention which they now attract. More correct acquaintance with fundamental differences has placed the treatment of fevers in the present day on veritable vantage-ground.

I have already dwelt upon the very significant fact, as pertains to the typhoid type, that it not unfrequently happens that for a few days we hardly know what disease we have to deal with. With the least suspicion of its advent, much caution is needed. The pulse and temperature may be some guide; but the pulse and temperature may both run high, and then rapidly fall to the normal standard. I was requested to see a lady who seemed to have very suspicious symptoms of fever. The pulse was above 100; the temperature 102°. There had been rigors, pains in the limbs; and she had headache, anorexia, and sickness. The question was asked, "Is it fever?" My reply was guarded. I said, at my first visit, "I cannot tell; it will require a little more time for the decision." The symptoms quickly declined, and in a few more days she was out and well.

The conditions of biliary disarrangement, as I have already insisted upon, ought not to be combated by the fearless use of drastic cathartics. It should be held in mind that the morbid product in this distemper spontaneously seeks an outlet in the intestinal canal precisely as eruptive fevers localise their effects on the skin; and that to institute irritation in the glands of the ileum and colon is to hurry on to its development the ulcerative process in these structures. An aperient should be sought in some mild laxative, such as castor-oil, a few grains of rhubarb in peppermint-water, or in a small dose of Gregory's powder. Purging is not only harmful in its immediate effects on the mucous membrane, but large splashy stools, and, still

more, aqueous evacuations, reduce the general strength, which from the first should be most carefully and jealously husbanded. The mineral acids, and more especially the hydrochloric acid with the chlorate of potash, are to be commended as forming a generally required remedy. According to Murchison, when the blood becomes loaded with nitrogenous products which are more or less ammoniacal, acids are to be regarded as beneficial. When the surface is hot and dry, the solution of acetate of ammonia with nitre and camphor constitute a good medicine. In the case of Dr. Ievers' patient above referred to, and in whom there was acute mania, wine and cold to the head had a good effect; and strict orders were enjoined that she should be watched and rather perseveringly persuaded to keep in bed, than force to be employed. A patient with this symptom should never be tied down in, or powerfully restrained from getting out of bed. I have seen this absolute restraint followed by exhaustion, great harm, and death. In case No. 5, there was very distressing tympany. Charcoal, galbanum, lime-water, and other remedies, failed to relieve the distension. It was at length resolved to introduce the long tube, which gave instant relief; and the patient's comfort was each time immediately obtained. In some instances, there is difficulty in getting the tube to act; but Mr. Marsack dexterously introduced it for many consecutive days, and without any disappointment whatever in its effects. Sometimes this instrument does not answer, because an ordinary stomach-pump tube is used, in which the orifice is usually at the end instead of being at the side of the tube, when the hole is much more liable to be plugged up. When there is pulmonary congestion, with much meteorism, this mode of drawing off the gas, and thus allowing the diaphragm to resume its normal position, gives relief to the breathing; and, if there be considerable thinning of the lining membrane of the ileum, as there sometimes is, by the ulcerative destruction of the mucous and muscular coats, the probabilities of fatal perforation are greatly lessened. The practitioner should not fail to carefully decide between mere passive distension of the abdomen and the tympanites of positive peritonitis. Where there is lung-complication, large hot linseed-meal poultices covered with cotton-wool, and over both oiled silk, are a most valuable remedy. Where there is great heat of surface, tepid sponging gives comfort, and often induces sleep. Continued insomnia has sometimes to be more specially treated. The loss of sleep is exhaustive. Morphia, chloral-hydrate, and the bromide of ammonium, in such examples, should be employed. In hæmorrhage from the bowels, that grave complication may be treated with tannic and gallic acids, turpentine, lead and opium, and the tincture of ergot. Large doses of the perchloride or permanganate of iron I have known of signal service.

With regard to the administration of stimulants, much discretion is needed, and all the objective symptoms ought to be fully and carefully considered. To stimulate without the proper indications

would be to favour acceleration of the pulse and increase of temperature, and to render the patient restless and uncomfortable; and to not supply this aid when demanded would be to allow the asthenia to become more proclaimed, and those congestive complications which are so intimately connected with irregularity and powerlessness in the circulatory function to become more developed. The right and timely use of such means of treatment can hardly be over-estimated, as in many instances a critical period is thus tided over, and the lowered forces of vital action receive support, whereas the case would otherwise have a fatal ending. Some few years ago, there was in fevers a fashion to over-stimulate, as there is now, perhaps, a tendency to overfeed. It may also here be observed, that there is with many a loose and an irregular way in ordering wine and brandy. They should be given with the care and accuracy of medicine. They are emphatically remedies. Half, three-fourths, or a wineglassful of wine may be ordered, without any reference to the size of the glass; and thus a patient may get as much more than, or only half, the quantity desired. Stimulants ought always to be measured in a graduated measure. The nurse should at once write down the quantity and time at which every dose is administered. A similar record should be kept of the medicines, food, and drinks taken, the passing of the excretions, and any other events occurring during the intervals between the practitioner's visits. The doses of wine or brandy can thus be altered according to the requirements of the case. In most instances, for the first three or four, or even six days it may be, wine is not required.

At the outset of the complaint, the vascular system is roused to preternatural energy, when the radial pulse and the cardiac impulse are fuller and more beating. When, in the course of these abnormal efforts, the excitement begins to be subdued, then arrives the period for the consideration of stimulants. The decision should not be from the radial pulse *alone*, because in some instances there is not just correlation between the artery at the wrist and the ventricular power. The radial pulse may be sometimes felt; and when it is regular, when the præcordial impulse is greatly lessened, and even when it is abolished, the flat hand should be placed over the præcordial region; the impulse noted; and the stethoscope should be applied to ascertain the true character of the heart's sounds. Stokes long ago pointed out the necessity of precise knowledge as to this particular. Diminished and enfeebled systolic contraction proclaims debility and the need of wine; and, if such obtain in the earlier days of the attack, the tendency to asthenia is markedly evident. The last named physician attributed this softening of the cardiac parietes to the interstitial infiltration, as it occurs in typhus. This view, however, of such cause is not tenable. It is quite true that the muscular walls become softer, as I have repeatedly seen on inspection; but it must be remembered that in all febrile diseases there is a primary and general blood-lesion, and greater or less

interstitial absorption of all the tissues, as well seen in the voluntary muscles. The process of assimilation becomes vitiated with the first development of morbid phenomena, and a rapid deoxidisation goes on in all organs and structures. It is a fact, however, of importance to reflect, as pertains to this particular question, that not unfrequently the heart sustains a loss of contractile power when there has not been time for those pathological changes in its elementary structures, such as are seen when softening is induced from more acknowledged and manifest causes. Again, putrescence after death in all fevers is often rapid. The enfeeblement of this organ, its diminished or even abolished impulse, the altered or absent first sound, and alteration in the blood-wave in the systemic arteries, are doubtless very mainly to be accounted for by the impress which the fever-poison makes upon the cerebro-spinal axis, on the great splanchnic nerves, and on the cardiac plexus in especial.

The reader need hardly be reminded here of the well-nigh general acceptance of the views of Virchow, that fever has its immediate cause in alterations of the nervous system, and that there is primarily more or less of a paralysed condition of the sympathetic and the vagus. This perversion and arrestment of function in the system is somewhat analogous to that depressed state produced by opium and other narcotics. To then stimulate is to carry on life for a time artificially. Wine is doing good when the tongue becomes more moist and cleaner, when the pulse declines in frequency, when the breathing is rendered slower, and when the patient is less restless. If the tongue remain parched or dry, if the pulse be accelerated, the skin hotter, the respiration more hurried, and the patient evince augmented restlessness and discomfort, the wine or brandy should be diminished. When there is much tremor and subsultus, stimulants are needed, as they were in the instance of the young gentleman's case, No. 6, in whom, as I have observed, jactitation was pronounced in remarkable degree. In young people, as the rule, far less wine is required, and in some of these it may not be required at all. In the old and intemperate, wine is indicated in greater quantity. Coldness of the extremities, cool, moist, and relaxed skin, and suddenly slow pulse, demand immediate and often large doses of wine and brandy. It has been my own plan to order a certain number of drachms of wine or brandy to be given every two hours, or, in advanced and perilous cases, every hour. They should always be administered in diluted form. Sometimes one or other may be taken in milk or beef-tea. This is better than giving them in larger quantities and at longer intervals. When the prostration is in grave and alarming degree, ammonia, ether, camphor, and musk are amongst the best diffusible stimulants. As respects diet, care should be taken not to oppress the stomach, and urge on the patient more than can be digested. The assimilative process becomes impaired, relatively with the declension of strength and the advance of the disease towards the crisis. It should be held in mind that glandular

secretions are given off in diminished quantity and in altered quality. The salivary, gastric, and pancreatic fluids become thus affected. From such considerations, too much farinaceous food should not be allowed. There is the most dependence to be placed on good beef-tea, and I have long been in the habit of recommending it to be thickened with corn-flour, tapioca, vermicelli, or arrowroot. Strong chicken-broth, veal-and-ham broth, and meat jellies, may from time to time be substituted as a change, and more especially during convalescence. During the days of more urgent symptoms, strong beef-tea should mainly be depended upon. Good milk with a small quantity of lime-water is most valuable. Having known perforation to be caused by a too early return to a solid diet, I have for a long time requested during convalescence strict rules as to the food. For three or four weeks, it is safer for the patient to eat light and digestible articles of diet. Another evil is to be guarded against. Remedies, wine, and food should not be so constantly given as to interfere with sleep. Sleep itself is a restorative: and it is a great mistake to be constantly giving something to break in upon sleep and rest. When recovery has fully set in, the stimulants may with advantage be changed. The patient has then mostly become tired of port wine. Sherry, Burgundy, and Madeira may be substituted. It is well to be cautious as to malt liquors, as I have known their too early use to have a tendency to reinstitute irritation in the bowels. Fresh air and change of scene add not a little in the restoration to health.

There is not a little satisfaction in the reflection that greater attention is now being given, not only on the part of the profession, but on the part of the legislature, and on the part of the public generally, to all matters pertaining to sanitary improvements, and that consequently the death-waste from enteric fever will soon become manifestly diminished. The medical attendant will become more and more appealed to, and his opinion will have increasing influence in all matters that have reference to the general health. It is very desirable that, in all instances of enteric fever, whether coming on endemically or when only occurring sporadically, the greatest attention should be directed by practitioners to the investigation of the cause. Examination into the surrounding conditions, and the ascertainment of circumstances as to whether it may or may not have been imported (as it is certainly contagious, though in limited degree), will in most instances solve the question; and more, with such vigilance at once bestowed, the spread of the affection can often be greatly curtailed. It would seem to be undeniable that, in all towns where new drainage-works have been fully and efficiently carried out, there is one danger of which the very perfection of such public necessities has proved a cause. The gases, by having none of those outlets which they had when the old drains were bad and loosely made, or when there were open drains, become constrained and concentrated in their new channels; hence there is greater

pressure, on the traps of the houses, by their being forced up the private drains. I have known some apt illustrations of this fact. Great numbers of the occupants of houses would be glad to render themselves safe from this danger, if they knew how such could be accomplished; but unfortunately there has been, on the part of the public, little heed given and much ignorance relative to these matters. The suggestions of the medical advisers would, if the facts of such cases were clearly pointed out, in the great majority of cases be complied with. A few of the rules for observance would be to insist on the importance of the waste-pipe of cisterns being carried, not into the drains, but into the open air; that the soil-pipes of the closets should be tapped; that the main drain, after it leaves the house, should be ventilated by a four-inch pipe being carried above the roof, and as remote as possible from any upper windows, and that the efficiency of the traps should be from time to time ascertained.

I believe there has been more confidence in syphon-pipes than has been warrantable. I am satisfied, from some investigation relative to this particular point, that gases not unfrequently pass through the water of such syphons and give rise to disaster. During certain winds, when the external air rushes up the drain, the noxious gases are often driven through the syphon; for it must be remembered that, through the lighter specific gravity of such gases, their pressure is made on a thin stratum at the uppermost part of the water in the bend of the syphon, and then the polluted air bubbles through. This I have ascertained to be the fact. The only safety lies in a ventilating shaft. Cesspools ought always to be tapped. An architect not long ago told me that there is frequently a great omission in the examination of a house, by the over-looking of the large leaden pipe which immediately leaves the pan of the closet. These pipes, this gentleman said, are apt to become corroded and perforated, whereby a main-drain may ventilate into a house. Another fertile cause of fever throughout the country is to be found in shallow wells, frequently made in proximity with tenements and cottages. They often receive surface-water, and become contaminated by percolation from adjacent drains. In all towns where there is a public water-supply, there should be a compulsory service.

I may here, not inopportunistically, give the case of an uncommon form of enteric fever in which there came on spontaneous gangrene.

CASE IX.—A. R., a young woman, aged seventeen, of light complexion, and volume of flesh not much reduced. The initiatory symptoms were ushered in with rigors, lumbar pains, and frontal headache on October 3rd. She was attended by our House-Surgeon, Dr. Davy, as an out-patient during the first ten or twelve days of her illness; and at the expiration of that time I first saw the patient with him. She was then lying on her back, and answered questions perfectly. There had been but little delirium, no diarrhoea, nor any notable degree of tympanitis. She did not complain on pressure at the right iliac fossa, nor was there any gurgling. Two rose-red

lenticular spots, which faded on pressure, were seen at the epigastric region. Tongue brown and fissured in centre, moist at edges; and sordes on the lips. Bowels open once or twice during twenty-four hours. Pulse 130. The right foot and leg were inflamed and swollen, and boggy on manipulation. From knee to ankle, on the postero-lateral aspect, was a large reddish-brown configured discoloration. The pulp of all the toes was black; the blackness shading off into claret-coloured margins. She had excessive pain when the limb was moved. Dr. Davy had, properly, placed the limb in cotton-wool; had given her bark and ammonia; and had ordered port wine, brandy, and jellies and strong soups.

October 24th. The skin broke about three inches above the ankle, when half a pint of chocolate-coloured sanguino-purulent matter escaped. A lotion with Condyl's fluid and charcoal poultices were applied.

November 1st. The leg presented a fearful aspect. A large open ragged cavity, from five to six inches long and three inches wide, had been produced, and the tibia and fibula were distinctly exposed; and from this cavity purulent matter was constantly poured. Pieces of pale muscular tissue hung from its margins in depending strips. Pulse 124, feeble.

November 4th. A large slough came away.

November 5th. She was much worse. The gangrenous discoloration had extended to the upper third of the thigh. The cavity was still wider and deeper. The heel of the left leg began to assume a gangrenous condition. The stimulants were increased in quantity, and nourishment was given at shorter intervals; but she gradually declined, and died November 8th.

Spontaneous gangrene in fever is not common, and it is more rare in enteric than in typhus. When it comes on in this manner, the legs and feet are most prone to be affected, which is perhaps to be accounted for by their remoteness from the central organs of circulation. Murchison says three of these cases are given by Trousseau, and that Trousseau ascribes this condition to the obliteration of the arterial trunks. This conclusion is, however, not so certain, because scarcely any proofs have been given substantiative of Trousseau's assertion. I believe that general contamination of the blood and languor of the circulation are rather the conditions constituting this cause; because sloughing of the integuments, the corneæ, and other parts, takes place, which are not supplied by the larger arterial branches. It begins by loss of temperature in the limbs, with pain and aching in the feet and toes. Huss, Jenner, Lyons, and Murchison, give examples of this complication in typhus.

XVIII.

RELAPSING FEVER.

INTRODUCTORY OBSERVATIONS.—Throughout the wide domain of Medicine there is no subject more interesting, and none of such great and grave importance as that of Fever. No other malady numbers such multitudes of victims, and no other malady so universally prevails. In every age and in every clime it has in the inscrutable ways of Providence waged a remorseless war with, and been the direst scourge of, the human race. The edge of the sword and the deadliest battlefields have not cut down the flower of the species like the ruthless attacks of this fell destroyer. No society has even been long exempt from its occurrence, and no generation passes away without a sacrifice from this cause which far exceeds all computation. Sydenham declared, exclusive of deaths from violence, that by this appalling class of diseases two-thirds of mankind annually perish. If such be an over-estimate of its havoc in the days in which we live, it is a fact, too fully and forcibly impressed upon the philanthropist as well as the physician, that in every community the nosological varieties of fever make up by far the greatest sum-total of deaths, and that not infrequently they fearfully swell the bills of mortality. And if fever be contemplated in its wider spread and severer prevalence, when it extends epidemically, or when it comes in still more terrible visitation pestilentially, numerical calculations and the most pictured descriptions can hardly give any just estimate of the destruction and misery which follow in the track of its devastating march. That these occasional ravages have from the remotest ages of mankind produced enormous sacrifices of life, the most ancient records declare. In the sacred books of the Old Testament we are repeatedly told of the "famine and the *pestilence*." In Numbers, Deuteronomy, Samuel, Jeremiah, Ezekiel, and in other parts of Holy Writ we have the testimony of its prevalence amongst the earliest generations of men; and when we read of the "pestilence that walketh by noon-day and the arrow that flieth by *night*," we are reminded of a fact in the character and in the natural law of the diffusion of this disease which obtains now as it obtained in those distant times.

The most ancient of profane writers notice these calamitous outbreaks. In the lofty and sonorous language of Homer a fine description is given of a nine days' pestilence which occurred in the Grecian camp.* The famous plague of Athens, which Thucydides in such graphic epithets related, and which the historian believed to have been imported into the Peræus from Egypt, was in the opinion of learned commentators a malignant form of typhus. In the works of Aristotle, Plato, Hippocrates, Herodotus, Arætus, and other of the Greek authors, the accounts of what were fatal febrile visitations are familiar to every scholar. These eruptions of an infectious distemper which from time to time came with desolating spread amongst the kingdoms of the ancient world, sweeping multitudes away, caused such a popular dread of fevers that in both Grecian and Roman mythology a special divinity is assigned to them. In Livy, Lucretius, Tacitus, Pliny, Plutarch, Ovid, and Virgil frequent allusions are made to the pestilences which on various occasions carried off vast numbers of the Roman citizens; and too often these disasters were referred not to the infringement of natural laws, not to any conditions over which human forethought and human endeavours could exert a salutary influence in limiting their spread or in their prevention, but they were ascribed, as Celsus absurdly tells us, to the anger of the immortal gods—"Morbos tum ad iram Deorum immortalium relatos esse." It is evident, however, from the works of Livy, † Tacitus, ‡ Herodian, § and other of the Roman historians, that noxious influences and the violation of the ordinary rules of health were in the production of epidemics acknowledged. The first named, in the record of a pestilence that occurred in the autumn B.C. 464, attributed the origin of the disease to crowds of men and herds of cattle which had come in from the country and were huddled together within the walls of the city. "Ea colluvio," says Livy, "mixtorum omnis generis animantium, et odore insolito urbanos, et agrestem, confertum in arcta tecta, æstu ac vigiliis angebat, ministeriaque in vicem ac contagio ipsa vulgabant morbos."|| After the decline of agriculture, in the latter times of the empire, when the cities had become congested with a redundant population, and the rural districts thinly inhabited; when the once fertile Campagna, which so long had been prodigal of corn and wine, and had afforded such abundant subsistence, became uncultivated, especially during the reigns of Augustus, Tiberius, Claudius, and Nero; and when the populace were rendered dependent upon the harvests of Lybia and the garners of Egypt, then *fevers*, the constant followers of scarcity of

* When Homer speaks of the *arrows* of the angry god (*νυκτὶ εὐκλῶς*—gloomy as night) spreading havoc amongst man and beast, he employs metaphors like those of the Inspired Writer.

† Lib. xli. 21.

‡ "Annalium," lib. xvi. 13.

§ Lib. i.

|| Lib. iii.

food, were of frequent occurrence.* The account which Procopius has left of a terrible epidemic which raged in the sixth century, during the reign of Justinian, and which produced an enormous loss of life, will doubtless be remembered by the reader.† Gibbon, with his usual acuteness, observes that the free and frequent intercourse which there was in the Roman provinces, and the great mingling together which resulted from constant wars and emigrations, had the effect of disseminating diseases, and that such were doubtless the natural and common causes in the diffusion of infectious distempers amongst the ancient populations of Europe.

In the scanty and unconnected chronicles of succeeding centuries, sufficient remains attestive of the fact that in one or another part of the world, and after uncertain intervals of time, these dire calamities burst forth with far more destruction than any convulsions of nature, or the turbulent passions of belligerent nations. If we pass on to those times which are regarded as the period of the revival of letters and religion, when history receives greater credence, and when national events are described more accurately and in ampler detail, we marvel at the records which are handed down to us of the stupendous extent and effects of these catastrophes which must to those who were cotemporary with them have seemed, in the language of Hecker, as if the hand of the destroying angel had descended upon earth; and which narratives are certainly amongst the most dread and the darkest pictures in the annals of mankind. That these disasters, which produced so much consternation and misery, were for a time succeeded, as Hecker asserts, by despair, unbridled passions, and a general licentiousness, the pages of history incontestably prove; yet it is equally evident they did not come as unmixed evils, as harmful agencies to be followed by no future good. Like those volcanic commotions and mighty upheavals which it would appear were necessary to agitate and break up the earth before it became more settled and perfected, human society received from these shocks not only a paralysing and prostrate effect, but in the process of time, when calmness succeeded dismay and a more hopeful spirit was inspired, an awakening and a resuscitating influence was experienced; men's minds were roused from torpidity, ignorance, and superstition, and the philosophic historian regards them as the forerunners of increased intelligence and social progress. And if the same kind of reasoning is applied to this subject and a similar view is brought down to times much nearer than those to which reference is now made, even to recent periods, great epidemics have constituted severe but salutary lessons in the evolution of important hygienic and sanitary results, and have elicited a deeper study into those occult factors and yet ill-understood conditions which are held

* Tacitus, "Annal.;" Claud., "De Bello Gild.;" Alison's "Principles of Population," etc.

† Paulus Ægineta, vol. i., p. 279; *Syd. Soc. Trans.*; Gibbon, vol. v., chap. xi. iii

as essential elements in their causation. And with the acquirement of more positive and precise knowledge of those laws by which they are engendered and extended, they have, in their limitation and virulence, become more amenable to human endeavours. Nor is it altogether visionary to suppose that with continued advancement of science and the light of fresh discoveries, not only in prophylactics, but in the juster conceptions of morbid phenomena, and with a higher state of civilization, these occurrences will become still more rare, and, when they do come, be much less fatal in their effects.

It would be out of place in this memoir to make more than a passing reference to some of those fearful visitations. History tells us that twenty times in ten centuries the plague invaded England. We are told that in 1333 one quarter of the swarming myriads of China were thus swept away. After having originated, as it was believed it had done, in the Celestial Empire, it travelled to the western countries of Asia, thence to eastern and southern Europe, and finally to the kingdoms of the north; nor did it lose much of its severity in this long journey over the greater part of the globe. In three years—1347 to 1350—it destroyed 25,000,000 of human beings, or, as it is computed, about one-fourth part of the inhabitants of the old world.* In the latter part of the fifteenth century another scourge made its appearance, which Tweedie† points out to have had many characteristics resembling the fever about to be described in these pages. This was the celebrated Sweating Sickness, which first visited this country in the autumn of 1485. The battle of Bosworth had decided the fate of England; the crown of Richard had been placed on the head of Richmond; and the nation, long weary of anarchy and bloodshed, had scarcely begun to rejoice in the prospect of a long and happy peace, when another foe, more subtle and more deadly than the demon of war, suddenly started into being, and struck terror into every breast. A violent febrile distemper broke out in the ranks of the victorious Henry, which spread far and wide. It was so fatal that Holinshed says, "Scarce one amongst a hundred that sickened did escape with life";‡ and Godwin calls its fatality a *depopulation*. In 1489, at the siege of Granada,§ 17,000 troops died of a malignant fever, which proves the terrible type of the attacks in those times. War and famine and fever were of such constant recurrence that they might well have been, as they were, considered the arch-enemies of the race.

During the sixteenth and seventeenth centuries great pestilential visitations immensely retarded the natural increase of the species in every part of the civilized world, and more especially in the urban communities of European kingdoms. The types of infectious com-

* Guy de Chauliac, Tract., ii., c. 5; Boccacio, "Decameron," Giorn. i., Introd.

† "Lectures on Fevers delivered at Royal College of Physicians," 1862, p. 6.

‡ Holinshed, vol. iii., p. 482.

§ Vilalba, 1803, vol. i., p. 69.

plaints were three hundred years ago far more malignant. If, as some have supposed, we are to regard the black plague as the prototype of typhus, the sweating sickness as that of relapsing fever, and the inflammatory pleuro-pneumonic fever as that of influenza, it is obvious that these respective diseases have with the lapse of time become less virulent. In 1550—1554 a petechial fever swept off 100,000 persons in Tuscany alone.* The *Morbus Hungaricus*, which in 1566, in the reign of Maximilian II., spread over Europe, was doubtless the same affection.† The mortal description of pleurisy at Vienna in 1535, which extended to Brescia and Lombardy in 1537, and which visited Switzerland and Upper Italy in 1557, was, there is every reason to believe, an intensified kind of modern influenza.‡ In the works of Castro§ and Roboretus|| we are told how famine and fever stood in terrible relation to each other at the close of the sixteenth century. In 1593, in eight months, 11,166, were cut off in London, which number was fearfully high if the comparatively small population of the metropolis at that date is considered.

Of the following century the same sad story has to be narrated. From 1619 to 1648, during the thirty years' war, famine and fever made greater havoc than the sanguinary contests of that turbulent period.¶ Murchison, who quotes from several of the older authors, asserts that in 1641 the south of France, and indeed the whole of Europe, was devastated by typhus.** The accounts of Diemerbroeck, Hodges, and De Foe of the Great Plague are too familiar to need more than mention. In 1665 it is said that in London 100,000 people died. Sydenham says peripneumonia and pleurisies committed great slaughter in March 1665,†† but it is exceedingly probable that the pleuritic pneumonia was the intercurrent symptom of a specific disease. The same kind of epidemic described by Sydenham as *Tusses epidemicæ anni 1675 cum pleuritidie et peripneumonia supervenientibus*, attacked all ages and temperaments, and seized on whole families together (*integras simul familias pervalentes*). Bad harvests and insufficiency of food had preceded these outbreaks. And in 1698 failure of the crops in England was succeeded as the common consequence by a great and contagious fever.‡‡ The epidemics, which for some years followed the plague, seemed to exhibit some of the characteristics of that great pestilence.§§ And

* Palloni, 1804, and 1819.

† Sennertus, 1619; and Plouquet's "Repertorium."

‡ Sprengel's "Hist. de Med.," vol. iii., p. 88.

§ Castro, 1584.

|| Roboretus, 1591.

¶ Rhumelius, 1625; Riverius, 1648; West, 1840.

** "Treatise on Continued Fevers of Great Britain," 1862, p. 24.

†† Syd., "Opera Obs.," sec. 2, chap. i.; sec. 4, chap. v.

‡‡ Webster, 1800, i., 334.

§§ Sydenham says:—"Pestilenti aeris diathesi etiamnum ex parte perseverante, nec dum in aliam salubriorem immutate."

the diseases co-etaneous with it took from its epidemic constitution a peculiar impress.*

The last century was most rife of epidemics, and, if space allowed, it could be shown how widely, severely, and how repeatedly they prevailed. In 1720 a visitation appeared at Marseilles, the population of which city at that date was estimated at 90,000; and of this number 40,000 thus perished. According to Mackenzie, as we learn from the seventy-first volume of the Philosophical Transactions in 1751, not less than 150,000 were swept off in Constantinople, and the statements of De Mertens and Gagelsky inform us that in 1771 in Moscow 80,000 died." In the eighteenth century," says Milroy, "epidemic plague occurred nineteen times in Egypt, seven times in Turkey in Europe, four times in Dalmatia, four times in Germany, thrice in Russia, thrice in Spain, twice in Poland, twice in Greece, once in Italy, once in Sweden, and once in France."†

The records which we possess of the great Irish epidemics, about the time now spoken of, tell of enormous sacrifices of human life. From the writings of Rogers,‡ O'Connell,§ and Rutty,|| we learn that fever raged fearfully in Ireland from 1708 to 1718. In 1728 great scarcity of food was experienced, for three bad harvests had preceded that year, and the follower of famine again appeared.¶ In 1740 and 1741, as computed by O'Connell, 80,000 died of fever in Ireland. In the last named year, according to Rutty, a *relapsing* fever was present in Ireland, which bore the closest resemblance to the relapsing fever which was so common in Scotland exactly one hundred years afterwards. "In the summer months of 1741," says Rutty, "there was frequently a fever altogether without the malignity of the disease already described, of *six or seven days' duration, terminating in a critical sweat*, as did others also frequently; but in this the patients were subject to a *relapse, even to a third or fourth time*, and yet recovered."

Respecting the severer type to which this author refers, he says, "It raged through the provinces of Munster, Leinster, and Ulster, but was most fatal in Munster, where their poor were worse provided for, from whom the disease spread to the richer sort; and it was computed that one-fifth part of the inhabitants died."** And it is quite conclusive from the statements of Rutty and O'Connell that in Ireland, at the time now referred to, typhus and relapsing fever were co-existent; as I shall subsequently show, these two types of fever were co-existent a century afterwards. In 1771, we learn from Sims, of Tyrone, a fever burst out, which

* Prosper Alpinus, "Medicina Ægyptiorum," lib. 16.; and Pugnet, "Mémoires sur les Fièvres du Levant et des Antilles," Lyon, 8vo, 1804.

† "Quarantine and Plague," 1846, p. 20.

‡ Rogers, 1734.

§ O'Connell, 1746.

|| Rutty, 1770.

¶ Smith's "Cork," and Wakefield's "Ireland," vol. ii., p. 6.

** Barker and Cheyne, vol. i., p. 7.

claimed the prerogative of the plague, almost all other diseases vanishing before its sovereign presence.* We read that towards the close of the last century the state of the poor in the great towns in Ireland was wretched in the extreme. Political antagonism, the discomfiture and fear which followed rebellion, the general want of employment, and periods of famine were the great causes which at this date rendered that part of the United Kingdom the prey of contagious fevers.

Strother described a malignant fever which raged violently in the years 1727 and 1728, and which, according to this author, swelled the bills of mortality in London at the high rate of a thousand a week.† In the well-known essay on fevers by Huxham, putrid, malignant, and petechial fevers, as he termed them, widely and fatally prevailed up to the middle of the century. In the writings of Pringle,‡ Lind,§ Grant,|| and others, it is most conclusive that a bad type of typhus thinned the ranks of the army, and cut down the effective force of the fleet. In the literary remains of minor and provincial writers there is abundant testimony to prove the frequent visitation of febrile epidemics in most of the cities and large towns of the kingdom. The doctrines of Hoffman, Baglini, Cullen, Sauvages, Boerhaave, and other celebrated observers, had been deduced from the vast opportunities which were then presented by the constant recurrence of epidemic eruptions. The time had now arrived when the phenomena of fevers were more attentively and more correctly studied; and notwithstanding it was then too much the fashion for theories to be propounded, and facts sought in their substantiation, instead of facts first being noticed, and then accounted for on physiological and pathological principles,—yet certain it is that a great advance was made in this particular department of medical science.

We are here, however, more concerned with what occurred in our own country during the present century. The terrible mortalities which had marked the visitations of fever in Ireland, and the repeated epidemics which prevailed in London and the cities and large towns of the United Kingdom about two generations ago, roused public attention to this great cause of common danger. The contagiousness of these attacks was broadly acknowledged, and it was felt that active means for adoption were imperiously demanded. In the metropolis and various other places fever hospitals were established, and it was found that in the segregation of the affected was a rational means in limiting the spread of the distemper. The privation and misery which the armies of Napoleon produced on the Continent became the fertile cause of an infectious typhus which was widely disseminated. The return of our troops after the retreat from Corunna imported a fever, the development of which had been

* Barker and Cheyne, vol. i., p. 8.

‡ Pringle, 1750.

† "Observations on Fever," London, 1729, p. 3.

§ Lind, 1763.

|| Grant, 1771.

favoured by mental depression, consequent upon disaster and the overcrowding in their transport home.* Hildenbrand,† Hufeland,‡ and Baron Larrey,§ give similar accounts of what occurred after the campaigns in 1806-7 in Austria, Russia, Poland, and in France. Protracted sieges and sanguinary battle-fields were not so fatal as those dreaded fevers which were caused by the dismay, the want, and the misery of war. "Wherever war or other cause," says Corrigan, "has produced *want*, there also has been *pestilence*. Our own civil wars for the last 700 years have been followed by it. During the wars of Montrose, in the reign of Charles I., fever devastated Scotland. In 1813, in the flight from Russia, it followed like its shadow the course of the retreating army."¶

In no part of the British empire has fever existed to the same degree as it has existed in Ireland, and that "bad eminence" the sister island has maintained up to the present century and to the present time. A recent writer, when speaking of the prevalence of fever in that part of the United Kingdom, observes:—"Since the national devastation which resulted from the protracted and exhausting wars of the sixteenth and seventeenth centuries, the epidemic recurrence of fevers would seem to have assumed a more fixed and determined periodicity. Thus, for the last two hundred years, almost every quarter of a century has been signalized by a more or less fatal invasion of these diseases. Indeed, so nearly fixed and definable seem the laws which govern the movements of the great epidemics of this country, that we can almost with certainty predict their return, like that of some ill-omened meteor of the olden time. And experience of the past shows that it is far from an improbable prediction, that ere a score or two of years shall have passed over our heads, we may be again called upon to combat a pestilence as widespread and as fatal as that which will ever make the last decades of our social history remarkable. Our own century has already witnessed no less than three epidemic visitations of first-class magnitude and mortality."¶ Assuming, as Barker and Cheyne observe, that the population of Ireland in 1817 was 6,000,000, it was calculated that 1,500,000 persons suffered from fever in the epidemic which raged 1817 to 1819. In Dublin alone there were 70,000 cases, a third of the entire population affected, and it was calculated that this visitation, which spread throughout the country and made it like a general hospital, swept away not less than 65,000 human beings! In the fever hospital in Cork, in four years, 1817 to 1820, not less than 13,621 cases were admitted.** In one year, 1818, the large number of 7,608 were admitted into the

* McGregor, 1809; Hooper, 1809.

† Hildenbrand, 1811.

‡ Hufeland, 1814.

§ Larrey, 1812, ii., 341. See also *Edin. Med. & Surgl. Journal*, 1817.

¶ "Famine and Fever," 1846, p. 23.

¶ Lyons "On Fever," London, 1861, p. 4.

** *Report of Cork Fever Hospital and House of Recovery*, 1861, p. 9.

Cork-Street Hospital, Dublin; 17,894 into the House of Industry, Dublin; 10,408 into the Fever Hospital at Cork; 2,729 into the Waterford Hospital; 4,829 into the Limerick Hospital; and 1,924 into the Kilkenny Hospital—making a grand total of 45,392 admitted into these establishments alone.* “We have in this epidemic,” says Corrigan, “fever following famine as closely as effect can follow cause; in every instance the appearance and the prevalence of the one being an indication of the commencement and extent of the other.”† The previous great epidemic (that of the close of the last, and the beginning of the present, century) followed the bad harvest of 1797, and it disappeared with the abundant crop of 1801. Another visitation burst out after the bad harvest of 1816, and began to decline after the abundant harvest of 1818.

The next epidemic followed the unproductive summer of 1825, when the intense heat scorched up the ground, injured the cereals, and rendered extremely deficient the potato crop. This visitation continued from 1826 to 1828. A great reverse of trade and many commercial failures contributed to the general condition of distress. In the Liberties of Dublin twenty thousand artisans were thrown out of employment, and amongst these the epidemic had its origin.‡ It spread to the larger towns, and, as usual, the distemper was communicated to the urban communities of Scotland. In 1825, 1826, and 1827, the admissions into the Cork Fever Hospital were 11,406.§ In the Fever Hospital, Dublin, 12,877 were admitted during thirteen months. Another decade passed away, and typhus burst forth in fearful form. In 1837 the Dublin hospitals took in 11,085 cases of fever. In 1835, 1836, and 1837, the Fever Hospital at Cork admitted 9,422 cases. The great famine fever, which desolated the kingdom in the years 1846, 1847, and 1848, can only be compared with the terrible scourges of the plague which raged in the middle ages. The enormous mortality which it produced is so well known that it need not be more than referred to here. From the reports of the Irish Census Commissioners it is proved that in ten years, 1831 to 1841, the deaths from fever reached 112,072. In the ten-year period from 1841 to 1851 the deaths from fever alone reached the enormous and startling figures 222,029! And to this appalling statement, if the full truth had ever been recorded of those who perished by the wayside, in the lonely cabin, and in the emigrant ship when fleeing from the land of panic and pestilence, many more thousands would have to be added.|| When speaking of this epidemic Murchison says:—“The fever was general over Ireland. In Dublin, the lowest estimate of the number of cases was 40,000, and for the whole of Ireland the number probably exceeded one million.”¶ Another writer

* Barker and Cheyne, vol. i., p. 23.

† Corrigan, p. 19.

‡ O'Brien, 1828, p. 515.

§ *Report Cork Fever Hospital*, 1860, p. 9.

|| Lyons, p. 5.

¶ Murchison, 1862, p. 49.

on this subject thus eloquently delivers himself:—"The years 1846 and 1847 were marked, not only in this country, but on the Continent, by a series of famines and succeeding widespread fevers, which were appropriately crowned by the terrible political convulsions of 1848. Among the states of Europe one unhappy country attracted universal pity by the intensity of its sufferings, and the depth of its despair. No history is extant which reveals profounder misery than that which crushed the buoyant heart and quelled the bold spirit of the Irish Celt. Succeeding ages will look back with awe and wonder at this spectacle of a nation's pangs, and will anxiously endeavour to trace out what may have been the causes which drew from the Divine Providence an affliction so severe."* And prior to the date of this national calamity, it is shown in Surgeon Wilde's valuable statistical report how fever prevailed immensely more in Ireland than in England. In the ten-year period from June 1831 to June 1841 the mortality from fever in Ireland was but a fraction less than one-tenth of the whole mortality. In London during the same period the fever deaths were only one-fiftieth of the entire mortality.†

In Great Britain, as various writers have proved, Edinburgh and the large towns in Scotland, during the last half century, have gained the unenviable distinction of being the places where fevers are most rife. Christison calculated that in little more than the first fifty years of this century, 45,189 cases of fever were received into the Edinburgh hospitals, a number which, if relatively considered with the population, was larger even than the fever rate in Glasgow. In Edinburgh in 1818—1819 an epidemic of a relapsing description of fever occurred which caused great misery. In fifteen or sixteen months 2,000 cases were admitted into the wards of Queensbury House Fever Hospital and the Royal Infirmary.‡ In England those towns which have the greatest and most direct intercourse with Ireland, especially Liverpool, Manchester, and Bristol, have presented the highest death-rate from fever.§ And even under such circumstances the large towns of England are far less liable to fever than the large towns in Scotland. The admirable papers of Cowan give many interesting statements on this particular subject. From 1828 to 1837, when the population of Glasgow numbered about 200,000, there were 28,290 cases of fever. The average number of fever cases in Glasgow for seven years prior to 1837 was 1842 annually. In Manchester, with a population at the same time of 228,000, the yearly number was 497; in Leeds, with a population of 123,000, only 274; and in Newcastle, with a population of 58,000, only 39. In 1836 the fever cases admitted into the Glasgow Royal Infirmary amounted to 3,125; in the London Fever Hospital

* *British and Foreign Medico-Chirurgical Review*, No. XV., July, 1851, p. 28.

† "Report of the Commissioners of the Irish Census," 1841.

‡ Welsh "On Bloodletting in Fever," Edinburgh, 1819, p. 53.

§ Lombard, *Dublin Med. Journal*, vol. x.

during the same year only 264 were admitted. In 1838, however, the metropolis suffered more severely, as 976 were taken into the Fever Hospital, and the totality of deaths from continued fever in London reached the high figures 4,078.* Before the termination of the epidemic of relapsing fever in Scotland, during the years 1843 and 1844, it was computed that in Edinburgh 9,000 had taken the fever; that 33,000 had been affected in Glasgow; and that in Paisley, Dundee, Aberdeen, Greenock, and other places the prevalence of the distemper had been relatively high. In 1847 the admissions into the London Fever Hospital were 1,259; in Glasgow 11,425 were admitted into the hospitals; in Edinburgh 2,503 died of fever, and it was calculated that 19,254, or one in nine of the entire population of that city, suffered from it.† Murchison says that, in the year now named, 10,000 persons died of typhus in Liverpool, and that Manchester, Birmingham, Preston, London, and most of the large towns were affected, though to a less extent.‡ The same author believes that throughout England in 1847, 300,000 people had fever; and the Registrar-General records of that year, that in England and Wales 30,320 died of fever. In passing on to more recent years this sad story of disease and death is still disheartening and full of dismay, as in both war and peace this arch-destroyer of our kind is stayless and implacable. Dr. Lyons, who was an eye-witness to its devastation amongst the armies of the Crimea, says:—"I think I should be justified in saying that considerably more than half of the whole deaths of the French Army were caused by fevers or by the diseases secondary to fevers." And the same writer asserts that 10,000 of the flower of the British army during this campaign were in seven months carried off by disease (chiefly fever).§ In 1856, when the French force was 120,000, it is calculated that 12,000 were attacked with typhus, and that 6,000 died. In England and Wales, during the ten-year period from 1857 to 1866 inclusive, 181,443 died of continued fever, and in the last named of these years the mortality from this cause reached 21,104.|| In the seven years 1861—1867 the average number of deaths from typhus in London was 2,865 per annum; 3,689 in 1864; 3,232 in 1865; 2,681 in 1866; and 2,174 in 1867. In the whole of England, by typhus, typhoid, and typhimia, in ten years, from 1856 to 1865, no less than 177,288 lives were lost, averaging 17,729 deaths per annum. And it is calculated that by these fevers 150,000 persons are attacked annually.¶ According to the *Report of the London Fever Hospital* for 1868, not less than 3,657 cases were admitted into that institution during the year, the largest number since the foundation of the charity. If reference be made to the Registrar-

* "Registrar-General's Reports."

† Paterson, 1848, p. 386.

‡ "On Fever," p. 49.

§ *Ibid.*, p. 3.

|| Murchison, p. 51.

¶ *Lancet*, Feb. 29th, 1868 (From Registrar General's Reports)

General's Report for 1866, a large accumulation of facts are there given relative to febrile diseases which are of the most startling description, and which call for renewed exertions on the part of the philanthropist and the physician. In that year fever killed 21,104 persons, exclusive of the vast numbers who perished from the same cause in Ireland and Scotland, whilst cholera, which gave rise to such widespread alarm, only destroyed 14,378. Our familiarity with the terms typhus, scarlatina, and measles seems to render us less impressed with the far greater destruction which they produce. If we take five zymotic diseases, viz., fever, scarlatina, measles, whooping-cough, and small-pox, and note their aggregate mortality in 1866, it is shown that by these alone 62,522 individuals were destroyed; and for the ten-year period 1857 to 1866 inclusive, the same five mortal visitants swept off 610,072 human beings. And what renders the reflection on this great and gloomy fact more painful is that a very large proportion of this stupendous loss of life was unnecessary, and from causes which under well-concerted human means might have been immensely mitigated. An examination of the prevalence of these diseases in the metropolitan districts proves how large a proportion prevailed in the eastern and poorer parishes, where bad ventilation, overcrowding, defective drainage, impure water, and all the depressing moral and physical effects of poverty are most prominently witnessed. The statistics of the London Fever Hospital give abundant confirmation to this assertion. St. Luke's parish, with a population in 1861 of 57,073, sent 234 cases to the hospital. Kensington, with a population of 94,627, sent only 6 cases; Whitechapel, with a population of 78,970, sent 322 cases; and St. George's, Hanover Square, with a population of 87,771, sent only 4 cases to the hospital. The *Times* called public attention to the great fever grounds of the metropolis, and it is admitted on every hand that this fearful waste of life, if it cannot be wholly prevented, ought to be very largely diminished. The leading journal pointed out how the eastern districts of London are the head-quarters of epidemics. In 1868, East London sent 1,014 cases of typhus to the Fever Hospital, being 102 more than were sent by all the rest of the metropolis. And out of 359 deaths that occurred in London from scarlatina during eight weeks in the spring of 1869 not less than 149 took place in the eastern district. Official statistics declare that the mortality of the great zymotic group is on the increase rather than the decrease. In 1850 the deaths from these diseases were 4,409 to every million of persons living. In 1866 the mortality had risen to 5,522 in every million of the inhabitants of England and Wales.

In this hasty sketch of the ravages of fever the reader can form some estimate of the terrible death-waste which from this cause is continually going on, which is, however, more fully and properly realised, when in some particular community, or part of

the country, an epidemic visitation is experienced, and which is not sufficiently regarded, when the enemy in stealthy and unrelenting manner is assailing the population. Though much has been done, and still much more is being accomplished in the arrestment of this huge life loss, yet reasoning from the past, and holding in contemplation certain unwelcome but indisputable facts—that little is fully understood concerning those occult laws by which the recurrence of epidemics appears to be regulated; that it would seem there is a sort of periodicity in their return; that the very progress of civilisation, by favouring the growth of urban communities and thus engendering malefic influences, becomes a cause of epidemic development and diffusion; and that in a complex state of society, like that in which we live, poverty, that powerful predisponent to all diseases, must ever obtain—from a contemplation of these truths it is repeated, and of kindred reflections, there are cogent grounds for the belief, that the time is still far distant when the scourges shall cease to afflict and to sweep away mankind. That a continuous sacrifice of the species, like that now evidenced, and, too, in such large proportion of the youth and flower of the race, ever entered into the designs of Providence, no thinking mind can admit; as well might it be said that the heathendom of savage tribes and wandering barbarians shall not decline before the progressive march of civilization; that the earth shall not be subdued; or that the many harmful moral agencies, which are so antagonistic to the well-being of society, and which so oppose the high destiny of mankind, shall always remain in baneful operation. Without, however, the entrance here into any subtle train of reasoning as to why such evils as these grave and desolating diseases should so largely and fatally prevail, it must be admitted, as before observed, that human efforts, if intelligibly and opportunely directed, have their spread very greatly under control. And the truth of this proposition, both by public records and individual experience, is every day with more marked and irresistible evidence forced upon our conviction. Sanitarians and statisticians know where, under what circumstances, and in what probable numbers infectious fevers may be looked for; and they know too, that relatively, where the ordinary laws of health are violated, and where scattered cases of this class of diseases are allowed to remain and become the *foci* to diffusion—that these febrile affections will find the pabula for their existence, and then become most rife. The remedies, as I have remarked, lie much within our own power. The onward march of science has achieved great things, and the increase of this kind of knowledge, pursued as it is by so many able and zealous cultivators, is destined to become infinitely augmented. Preventive medicine, if it may be so termed, has received an impulse during the last decade, like unto which during an equal period it received in no previous age. It has become, as it were, a new department of study, a fresh field for the sagacity and the efforts of the

physician. There is the promise that rich rewards lie in the direction of this kind of investigation. The average duration of human life has been greatly extended, but it will be still very much more prolonged. It has long been said that its complete circuit is a hundred years. Dr. Farr states on his great authority that the mean life-time in the healthiest parts of England is now only fifty years, and that in the United Kingdom it does not exceed forty-one years. If such is the fact that we only live half our days, what ample grounds there are for the discoveries of science, the application of acquired knowledge, and the exercise of benevolence! The grand questions of public health appeal with greater force and eloquence than they ever appealed before to the intelligence and the loyalty of the physician, whose high calling will be still more honoured, from the weighty problems which he alone can solve, and the important consequences which his inquiries will determine. His office will not be only to cope with the actual presence of the enemy, but to watch the outposts and prevent his invasion.

I have above insisted upon the fact, and shall hereafter more demonstratively show, how famine and fever stand in correlation to each other; but more is demanded than the mere supply of subsistence to ward off the class of diseases now considered. Pure air and pure water are great and indispensable requisites in the maintenance of public health. Impure air and impure water as surely carry with them disease and death, as that the greater cannot be contained in the less. As ably stated by Sir William Jenner in his admirable address delivered at Leeds, the investigations of Snow and Radcliffe in our own country, and of Bellot in Holland, have proved that drinking-water is one of the greatest agents in the spread of cholera and enteric fever. The first named physician computed from the Registrar General's returns that in the ten-year period ending 1866, the enormous number of 150,000 persons perished in England and Wales by enteric fever; and it is now most broadly admitted that this vast army, chiefly composed of the thews and sinews of the nation, in the immense majority of instances lost their lives really by bad water. The inquiries which followed the epidemics of cholera in East London, and of enteric fever at Winterton, Terling, and Guildford, left no reasonable doubt as to the origin of those fatal visitations. The persons who died, said Sir William, at those places from typhoid fever, and a large proportion of those who died at the East of London from cholera, were as certainly killed by the water they drank, and killed without need, as if the water supplied to them had been contaminated with arsenic. The proofs now seem to be ample for the conclusion that minute quantities of intestinal excretion from cholera and enteric fever patients, when transferred into wells and water sources, will produce cholera and enteric fever in those who drink the waters thus polluted. Yet, in the face of this great and glaring fact, no real security is vouchsafed to the public against

this dissemination of these terrible ailments. The medical officer of the Privy Council would render it felonious for water companies to distribute water thus contaminated, and until that time shall arrive when neither cupidity nor negligence shall escape the verdict of public justice, so long will it be that the health and lives of the people are insecure. Where voluntary efforts have been wisely made the results have shown that this death-waste can at bidding of human will be immensely arrested. Before the recent improvements in Bristol, which have given to that city purer water and better ventilation, and more cleanliness in the homes of the poor, the annual mortality from typhoid fever was 10 per 1,000 of the inhabitants; since these improvements it has been only 6·5. At Merthyr Tydvil a yearly mortality of 21·33 has been reduced nearly two-thirds, to 8·66; and at Croydon by such measures the death-rate has been lowered from 15 to 5·5. The main element in the achievement of such an obvious good has been the plentiful supply of pure water. It is now acknowledged as an insufficient reply to say that water is bright and sparkling and even grateful to the taste, because Frankland and others have shown, by the elaborate processes of analytical chemistry, that this element may, when bright and pellucid, contain the deadly germs of disease. The water in the metropolis, at one time, was unfit for consumption. Its constant turbidity, caused by large amounts of nitrogenous organic matter and living organisms, rendered it unfit for drinking. Pure air and pure water are the first, the most essential requisites of existence.

From the large array of facts which have been accumulated attesting of those conditions which favour the diffusion of febrile diseases, the road to improvement and a salutary course of action is now broadly indicated. Every day's experience proclaims how much may be achieved by forethought and energy. Increased and ample hospital accommodation is one of the first requisites in the curtailment of all infectious complaints. To isolate the sick from the healthy is of paramount import, as it is an obvious and common-sense conclusion. It embraces that great and lauded practice of *stamping out*, which has been shown to be so advantageous in the present day. Hospitals for the reception of the affected should be arranged on very accommodating and elastic principles. There ought to be in every fever hospital a number of wards in which beds without delay could be put up for great emergencies. In the grounds, near the permanent structure, sites should always be ready for the erection of temporary sheds. The materials should be mainly of iron, and being stored away on the premises and in readiness, a great increase of accommodation could thus with facility be supplied when the hospital proper became full. During the prevalence of the epidemic about to be described in the following pages, when the Royal Infirmary and Fever Hospital in Edinburgh were filled, sheds were raised in the Infirmary grounds, and thus large numbers of patients were received who must otherwise have

remained at their own wretched homes and in thickly populated neighbourhoods, to extend the disease even much more than it did prevail. In reference to the question of proper hospital accommodation for fever, some apt remarks may be cited from the *Report of the London Fever Hospital* for 1868. "It may be asked," says the editor of the report, "what would have been the effect if there had been no Fever Hospital in London, and if the 12,753 cases of contagious typhus admitted into it during the last seven years had been distributed through the general hospitals."* It might also have been asked what would have been the effect if these twelve thousand cases had been compelled to remain at their own homes, scattered over the vast metropolis, the great majority from crowded houses and densely peopled places, each to become a focus to the extension of the complaint. The amount of disease, the loss of life, and the misery which would have been entailed it is impossible to calculate, nor would such calamities have been confined to the poor. Nor should hospital accommodation be limited to the metropolitan cities and the large towns of the empire. When in the wisdom and progress of these days village hospitals have in numerous places been tried and found to answer, every community, however small, would act wisely if some place of reception were always ready wherein those affected with infectious complaints could at once be isolated. The time must come when those precautions, which, if adopted, would most materially arrest that great and needless zymotic life waste which is continually going on, shall become imperative.

It is not the language of enthusiasm, and no visionary dream, to suppose that, at some future time, typhus and cholera, scarlet fever and diphtheria, measles and whooping-cough,—those terrible destroyers in the great zymotic group,—may by prophylaxis, by specifics, or perchance by some happy incident of discovery, be as much lessened in their virulence, and become as amenable to treatment as small-pox and ague. Certain of these fundamental sciences, upon which the rational superstructure of practical medicine is reared, have during the last quarter of a century become very largely extended, and it may be that in the ensuing generation therapeutics will make an advance commensurate with what has obtained in minute anatomy, in animal chemistry, and in physiology and pathology; and then will it be that our influence over will be more equal to our knowledge of the phenomena of disease. As I have already observed, that numbers exceeding vast armies should in every few years be slain by visitants whose ravages could be immensely limited, is a sacrifice which ought surely to be arrested. Public consideration should in still more forcible manner be aroused to this huge mortality. In addition to suitable hospital provision, a well-arranged system of visiting the abodes of the poor should in all cities and towns be established. Narrow courts,

* *Report*, p. 18.

crowded alleys, and pent-up streets should by competent and authorized persons be periodically visited, because overcrowding and bad ventilation enter largely into the causation of fever, and because such cases, if carried off without delay, might prevent diffusion, and even cut short an epidemic. In the Report above quoted it is said:—"Typhus fever, or the fever whose origin and propagation are due to destitution and overcrowding, is the disease on which the variations in the number of admissions into the Fever Hospital mainly depend." The drainage, more especially of private houses, should be under more vigilant surveillance and prompt authority. Low lodging-houses, and the dens of squalor, misery, and crime, which are the prolific fever grounds in all cities and large towns, should receive a greater share of governmental attention than has hitherto been conceded to them, and less should be left to unconcerted voluntary endeavours and the chances of private benevolence. When in addition to the ministers of finance, of trade, and of war there shall be a minister of public health in the imperial legislature, these questions, which are not only figuratively but literally of such vital consequence in the promotion of the general weal, will pass into the embodiment of measures which will ensure a juster and more equitable parliamentary recognition. The ancient Greeks blamed Agamemnon for the fatality of the plague, and Pericles lost caste because a dire distemper swept off the Athenians; and if the leaders of the senate are supine on a subject so pregnant with interest to all, the voice of public censure will render them unpopular. The oracles will have to be consulted, and these oracles will chiefly be found amongst the intelligent names and the high authorities in our own profession. For ages millions have been lavishly voted in subsidising foreign powers, and in the enormous preparations for the repulsion of the imagined invaders of our shores, whilst little more than units have been given for the contest with, and the extinguishment of, the alternately covert and more openly belligerent enemy Disease, which has slain millions more than have ever fallen by contending nations in the serried ranks of battle array.

ON THE GENERAL DOCTRINES AND ESSENTIAL PHENOMENA OF FEVER.
—Fever, or Pyrexia, terms of Latin and Greek derivation, like unto those names employed descriptive of the disease in other languages, metaphorically signify a sense of increased heat in the system, because it is the prominent and cardinal symptom; and it is remarkable that from a remote antiquity, through so many ages, and even until the days in which we live, an almost universal recognition of the truthfulness of such terms has been accorded both in medical writings and in popular phraseology. The term is familiarly used in a singular as well as a plural signification; in the first named manner to denote primary or specific fevers, and in the latter to designate the entire group of febrile affections. Under the head of pyrexia the ancients implied a most extensive and important

nosological distinction, as it comprehended not only fevers of all types and specific differences, but also inflammations ; and this arrangement was followed by Cullen and other systematic writers. They imagined this sense of increased heat to be as pathognomonic of the simple inflammatory as it is now demonstrably shown to be pathognomonic of the febrile condition. Modern chemistry and physiological experiments have proved that those figurative expressions which compare fever to heat or fire are less metaphorical than once was supposed. There is now much certitude in the theory held relative to the evolution of animal heat. It is a process of continuous combustion, and oxygen is consumed as in the more ordinary way of generating heat with other materials. When the consumption of oxygen in the body is excessive the temperature rises above the natural standard. We speak, and correctly, of symptomatic or sympathetic fever, but then the cause of it is manifestly local, and with the mitigation or removal of such localised cause, there is decrease or abolition of the fever. In idiopathic or essential fever there may be topical inflammation, but such is secondary or resultant, and the arrestment of the inflammatory process does not cut short the fever. Again, primary fever may pass through its course without any cognisable pathologic change in any organ or tissue. The morbid agent imbibed from without may, as sometimes happens in malignant typhus, rapidly destroy and leave no structural alterations which can at all account for the mortal issue, but such specific poison doubtless exerts like other poisons potent effects on the blood and nervous system.

Definitions of fever have been most varied. Perhaps the definition of Cullen as modified by Christison is as correct and concise as any which can be given ; viz. :—"After a preliminary stage of languor, weakness, and defective appetite, acceleration of the pulse, increased heat, great debility of the limbs, and disturbance of most of the functions without primary local disease." In ephemera or febricula the simplest and truest type of primary fever is presented ; and nosologists believe that both intermittents and remittents, and also continued fevers, are deducible from such type. The system, as we know, is subject to a number of powerful impressions made from without, respecting the intimate nature of which our knowledge is exceedingly limited, and these impressions only become manifest by the deleterious effect which is produced upon the functions of some one or other, or more, of the viscera. The derangements thus established within the frame acquire prominence from a variety of causes, such as the previous conditions of the organs more particularly affected, the vital energies of the constitution, and the modifying power of external and surrounding circumstances. These disorders become mixed up with, or react upon, each other ; some decline, others become more pronounced.

Hippocrates imagined fever to originate in a salutary effort on the part of nature to unload the body of some noxious matter which it

had imbibed. Stahl, also, though with some modification, espoused the same theory. Boerhaave entertained a notion that the cause was attributable to a morbid lentor of the blood. Hoffman believed that it consisted in a diminished energy of the nervous system. Cullen, who was inclined to the views of the latter, contended for the proximate cause being in a spasmodic contraction of the extreme vessels. Darwin supposed that the acquired poisons first produced a general quiescence in the arterial system, and that the subsequent heat was an exertion of the sensorial power consequent upon accumulated irritability; and Wilson Philip said that the cause of fever is owing to a debility of the capillaries, consequently an inordinate distension of them. Each of these theories, however, has been objected to, and cogent reasons asserted in support of opposed opinions; yet amid all the confliction of arguments from time to time advanced, no positive demonstration has yet been given, to settle a subject so long under disputation and involved in so much mystery. Broussais and other French pathologists assigned its seat to the mucous membrane of the alimentary canal; and contended that the various phenomena observed are but so many symptoms incident upon such affection. The followers of that doctrine, however, are undoubtedly erroneous in their views, and mistake for cause that which in reality is merely effect. The fevers of almost every country, from causes it may be that are inscrutable, as well as those which are acknowledged, present varieties in their action and general features; in one part they may have a disposition to take on the inflammatory type, in another to run into the adynamic state, and so on. From whatever common cause fever may be produced, it is certain that it undergoes very great modifications from external circumstances and personal peculiarities, in every locality some difference being discernible as to its nature and mode of affection. In cold climates typhus is said to prevail in the greatest degree, and in tropical regions intermittents and remittents. Certain districts, even in the same country, variously favour their propagation, while the moral and social as well as the physical conditions of the people exert an undoubted influence. When there occurs a combination of certain states accounted as highly favourable to the generation of fever, as the seasons, the weather, miasmatic poisons, deficiency of food, mortal calamities, etc., and a number of people simultaneously become affected, it is then said to be epidemic, and if the mortality be very great it is called a pestilence. Visitations of this description have ever been regarded with fearful apprehensions, their results having been occasionally of the most calamitous nature, whole countries and communities being affected, and producing the most appalling scenes of misery and distress; the histories of nations present too many corroborations of the remark, and afford the most melancholy records which such ravages have produced. The account, which is hereafter given of relapsing fever, was founded on very extensive personal observations made in Edinburgh during the years 1843

and 1844, when this form of fever so extensively prevailed in Scotland.

It seldom happens that two epidemics, even in the same district and amid the same set of people, present an exactly similar train of symptoms. The epidemic raging in Edinburgh during the years 1817-20, which was described by Welsh, manifested a great tendency to take on inflammatory action; hence the almost invariable practice of blood-letting, which, according to that author, was an indispensable mode of treatment. In more recent febrile attacks noticed in that city, the mortality has been much higher, and the fever assumed more of the adynamic type. The mortality of the epidemic of 1817-20 was 1 in 25 or 30; in that of 1826-7, 1 in 10·33; in 1837, 1 in 10; and in that of 1838, 1 in 6·27. In the fever about to be treated of, I shall endeavour to prove that it presented peculiarities rendering it wholly unlike any form of continued fever hitherto known. That it was not typhus, enteric, nor synochus, the most usual kinds of fever observed in Edinburgh and other large towns in Scotland, future statements will evidently attest. Some of its phenomena favoured the supposition that it presented certain intermittent properties, as shown by the frequent biliary derangement and the almost universality of relapses. (Tables V., VI., VIII., IX., and X.) Its resolution was nearly always by a well-marked diaphoresis, often copious, and coming on generally about the seventh but never later than the ninth day after its accession. (Tables V., VI., and IX.) The mortality was by no means high, the sequels were of an unusual kind; great general debility was present; a peculiar eruption resembling small ecchymoses or flea-bites often were noticed, with other anomalies rendering it of so novel a character as to almost warrant the appellation of *Nova Pestis*. Sydenham, who, as a high authority and philosophic observer regarding epidemic diseases, is perhaps most worthy of respect since the days of Hippocrates, remarked that these diseases were generally *most severe and fatal at the onset, that the treatment necessary at the beginning was quite inapplicable at the decline of the attack, and that, in the course of time, they as it were wore themselves out*. In the epidemic of 1843-4, the foregoing statements by no means hold good, as it will be shown that the essential characters of the distemper were very nearly the same at its close as at the commencement. Again, these visitations will sometimes gradually change their type; for instance, remittents becoming of the continued form, intermittents turning into remittents, and so on; the disorder in question, as insisted upon, maintained throughout its duration a uniform character. Thucydides, in his time, observed that during the existence of a pestilence other kinds of epidemic diseases were scarcely ever seen; Table IV. in a great measure proves this assertion, for out of 330 cases of fever at one time in the Edinburgh fever hospitals, only 10 of that number, being 1 in 33 of the aggregate, were of the genuine typhus, so that it appears two epidemics are seldom co-existent, and “while the tyrant disease is prevailing it

usurps complete dominion, and suffers no other disease to appear of an epidemic character."

Those variations which epidemics present, have been said to be produced by important dissimilarities in those external conditions and other states, accounted as favourable to their propagation; nor is it more improbable to suppose that poisons concerned in generating fevers, by being altered in themselves, from extrinsic influences or otherwise, should be productive of varied effects upon the body, than that different medicines should produce certain actions upon certain tissues, organs, and parts, but why those contracted poisons, or deleterious states affecting the system, should be followed by special results in their operations, and that medicines should manifest a partiality for particular localities and organs in the body, is quite inexplicable, and like many other considerations which have received the attention of philosophic inquiry, remains unknown.

To investigate the causes most predominant in the generation of a distemper like the one to be described, is of the greatest importance, in order to guard against similar occurrences in the future. There might be, it is true, essentials entering into the causation that it would defy human power to obviate, yet it is equally plausible to presume that circumstances existed, among the class of people with whom it was in a great measure restricted, that were highly favourable to its extension, and that might in some manner have been averted. Some time previous to its first appearance, numbers of the operatives and the lower orders had been for months out of employ, and with these classes the greatest misery prevailed. The following Table shows that out of 150 patients, only 36 of that number, at the time they were taken ill, were in full employment; 46 were in partial work; and 68 totally out of employ; so that about three-fourths were not in the way of earning a sufficient livelihood.

TABLE I.*

	Males.	Females.	Total.
Born in England	7	1	8
Born in Scotland	19	48	67
Born in Ireland	17	8	25
Natives of Edinburgh . .	15	35	50
Resident 14 years in Edinburgh.	12	18	30
Resident 3 years in Edinburgh .	8	10	18
Working in Edinburgh . .	38	35	73
In full work	11	25	36
In partial work	17	29	46
Out of work	29	39	68

* This Table gives particulars respecting 150 cases of epidemic fever in the hospital, during the month of August 1843.

Future statements as to this particular will I trust convince unprejudiced minds that the fever was very importantly connected with destitution, and, consequently, in some degree capable of prevention. There is perhaps no attack of sickness remembered that produced so much positive misery and distress amongst the lower orders in many of the large towns in Scotland as the epidemic fever of 1843-4. From the returns of the medical practitioners in Glasgow it was estimated, previous to its entire termination, that no less than 33,000 of the inhabitants had taken the distemper; and Professor Alison informed me that, from his own calculations, between 8,000 and 9,000 had laboured under it in Edinburgh. In Paisley, Dundee, Aberdeen, Greenock, etc., the numbers were correspondingly great. In each of those places, as in the metropolis, it was almost wholly confined to the poor, being quite in accordance with the statements given of epidemic and pestilential visitations, by several authors who at various times have recorded these attacks. The ancient writers not unfrequently associate poverty and disease with one another, and consider the former as a common cause of the latter. The third visitation of the "sweating sickness," which occurred in the year 1517, during the reign of Henry VII., was accounted for in some measure by the *poverty of the people*, it being stated that "among the lower classes the deaths were innumerable."* Referring to the same, another says, "of the common sort they were numberless that perished."† Mead asserts, "it has never been known when the plague did not begin amongst the poor." Also Salvaresa, who wrote on the epidemic fever of 1754, at Cadiz, remarks, "amongst the poor it was most violent."‡ Amid the poverty-stricken homes of the lower orders, are generally to be found in the greatest abundance those conditions which are calculated to generate disease. Their residences are usually in the most unhealthy localities of the cities or large towns in which they chance to live; the buildings that they inhabit are constructed with little or no regard to the natural laws, but with every reference to emolument on the part of some sordid proprietor; they are huddled together in confined apartments, which are ill-ventilated, and rendered impure by a redundancy of occupants; add to these the frequent accumulations of filth found in the vicinity of their houses, an insufficient supply of food and clothes, together with the want of cleanliness and domestic comforts, and too correct a picture will be drawn of the real condition of many thousands of the poor in this country. There were, comparatively speaking, but few instances of fever in the new town of Edinburgh, and those which did occur were in the back streets and similar places. Table No. VII. shows that out of 80 cases, which were taken promiscuously, no less than 66, being nearly

* Hecker, "On the Epidemics of the Middle Ages," p. 209.

† Godwin, p. 23.

‡ Dr. Mc. Lean.

seven-eighths of the aggregate, came from the Cowgate, Canongate, Grassmarket, West-port, and various wynds, the most humid, impure, and pent-up localities in the old town, the inhabitants of which are the most miserable and destitute set in the whole city.

In treating upon the subject at issue, such will be done as follows:—

I. Some general observations on epidemics, also showing that certain of the acknowledged states favourable to their propagation were present in this distemper.

II. Its history.

III. The pathology.

IV. The sequelæ.

V. The treatment.

VI. Conclusive remarks.

In so doing the chief statements advanced will be founded on the facts contained in original data, the writer having been for many months in daily communication with patients labouring under the disease. The statistical tables, which give important particulars respecting nearly twelve hundred cases, were compiled with the greatest accuracy and care. There may perhaps be certain points passed over which other writers have noticed, yet it is trusted that the most essential diagnostic marks, as well as an investigation into those causes which seemed to be conducive to its development and extension, together with other details, will be fully and sufficiently embraced in the account. Facts are the only means whereby we can arrive at positive conclusions, and the relation of such must ever take precedence of speculative notions and theoretical opinions, though pronounced by the most undoubted and respectable authorities.

I.—SOME GENERAL OBSERVATIONS ON EPIDEMICS, ALSO SHOWING THAT CERTAIN OF THE ACKNOWLEDGED STATES FAVOURABLE TO THEIR PROPAGATION WERE PRESENT IN THIS DISTEMPER.

The definition to be given of an epidemic disease may be as follows: it is generally a febrile disorder, or of acute character, prevailing at irregular periods, varying in intensity, continuing for an uncertain time, attacking a number of people simultaneously, and depending upon some common cause; as before remarked, at one epoch or another every portion of the globe of which history narrates has been subjected to these calamities, and from the remotest periods of antiquity epidemic and pestilential diseases have scourged mankind. Passing on several centuries to the middle ages, we have the most awful accounts of pestilential visitations. The Black Death, as it was termed, that raged in the fourteenth century, extended itself throughout the civilised world, and visited every country from the plains of India to the shores of Greenland, in some kingdoms sparing but a tenth of the inhabitants! In more recent times still, epidemics have manifested themselves in different countries, though

less frequently and of a milder nature. Epidemic occurrences of small-pox, typhus, cholera, scarlatina, etc., have with heavy mortality from time to time taken place; but reasoning from statistical sources of information, and comparing present with former mortalities, together with their being more uncommon, and of a less severe character in modern than in ancient times, it is fair to presume that civilisation has done much, and may still do more in warding off these terrific visitations. Previous to the great fire in London, febrile disorders were constantly affecting the people in one part of the city or another; the streets and thoroughfares were then dark, damp, and ill-ventilated; little regard was paid to cleanliness, and innumerable impurities contaminated the air; in fine, most of those conditions which enter into the epidemic constitution existed. The conflagration, though perhaps attended with incalculable loss of property, was ultimately followed by a general good. By opening out many hitherto pent-up and noisome localities, and thus perfusion of air taking place, the streets that were rebuilt being wider, and the dwellings more spacious, the previous unhealthy situations became comparatively salubrious, and the citizens found that those calamities were not the unavoidable executions of Divine wrath, but mainly owing to their own ignorance, and the consequent infringement of the natural laws. In former times Edinburgh was annually afflicted with severe attacks of typhus; but then the generality of the people lived crowded together. The wide, airy, and commodious new town was unbuilt; and at that time it was no unusual thing for the refuse of the city, the garbage of the shambles, and the general accumulations of organic matters, to be deposited at every corner; whilst the want of an efficient drainage, manure heaps placed in proximity with the dwellings, and a disregard for cleanliness and domestic comforts, together with similar causes, acted as powerful predisponents to disease.

Respecting the influence of certain external conditions, essential in the production of an epidemic attack, almost every author has been led to attribute an unusual degree of importance to some particular source. It would, however, be most correct to say, that epidemics spread more by a confluence of circumstances, producing when combined a common cause, than from any individual one. All causes, whether moral, social, or physical, that lower the tone of vital action, befit the body in some measure for its reception, and render it more susceptible of contracting the disease. The system during a state of positive health may be exposed to noxious influences with impunity, that would under other circumstances, as debility and depression, render it highly accessible to any prevalent disorder: hence it is that the poorer parts of a population, who constantly labour under innumerable debilitating causes, are far more liable to become affected than their opulent neighbours. The houses of the rich are airy and spacious, and constructed more in accordance to the rules of health; their fortunate possessors have less cares, are better

fed and clothed, and have a more liberal supply of the necessities and comforts of life. During the epidemic of 1843-4, in the Scottish metropolis, it was remarked that those who lived in the houses in the bottom flats in Cowgate, Canongate, Grassmarket, High Street, etc., were by no means so commonly affected as the inmates belonging to the various stories above. Now this fact at first seems anomalous, for, *ceteris paribus*, epidemics are generally most violent in the dwellings of the ground floor; yet, when the matter is inquired into, this apparent exception to a general rule becomes easy of explanation. The bottom houses being in more intimate proximity with the drains, sewers, and other sources from whence putrid exhalations are given off, we might reasonably suppose would be more unhealthy, and there a disorder be most prevalent, and very much more so than in the higher flats, especially when it is taken into account that many of the buildings, in the places referred to, vary from six to even ten or eleven stories high, an altitude so considerable, it might be thought, as to place them in some degree beyond miasmatic influence. The reason of this difference appears to be as follows: the occupants of the ground-floor houses are the majority of them small shopkeepers, greengrocers, pawnbrokers, victuallers, spirit-dealers, and the like, who are in tolerably easy circumstances; whilst, on the other hand, those who occupy the superincumbent strata of houses have chiefly but very narrowed means, or, what is not unfrequently the case, are in positive destitution; and the higher the ascent is made poverty increases in a corresponding ratio, the upper stories being let at a lower rent than the more convenient apartments below. This fact forms one amongst many incontrovertible arguments that the fever raged most where destitution existed; this part of the subject will, however, be more fully adverted to hereafter.

Epidemics are much influenced by endemic causes. The peculiar dispositions of any set of inhabitants, their natural inclinations to industry or inactivity, as well as many moral and physical agencies to which they are exposed, form conditions of weighty importance in rendering them more prone to any prevailing disorder. But by being repeatedly subject to such agencies, these in some measure, if not totally, lose their power, and the body in a most wonderful manner accommodates itself to existing circumstances. Those who have been accustomed to live in dry and elevated situations can seldom with impunity migrate to low and marshy districts; take the highlander from his hills to the close and humid valleys, and his health often suffers, at least until the system has suited itself to the change. The inhabitants of the tropics can bear without inconvenience, nay enjoy, a state of positive health, under conditions that must needs be highly deleterious to natives of the temperate zones. To endemic causes, then, epidemics may owe much for their various modifications. There may be certain states existing which are highly favourable to the propagation of disease, yet until the superaddition of some other element entering into the causation, the specific poison might not

come into full operation, or remain wholly inert ; also, where some of those conditions constituting the common cause should predominate, the disorder on becoming manifest might evince symptoms partaking most of the predominant cause. For instance, in a wet and humid district, where a particular form of fever is prevalent, it may require but heat or some atmospheric vicissitudes, an ill-fed, depressed condition of the people, or some similar occurrence, to bring into positive existence a fearful epidemic ; and the type which it assumed might partake most of the intermittent character, because here (in a wet and marshy district) were some of the chief causes of intermittents, while, it might be, the original disease, from whence the specific poison proceeded, possessed not previously the least symptom of the intermittent character ; therefore predominating endemic causes may in some manner determine the nature of an epidemic attack. Hufeland states, that "in the north of Germany, during the seasons 1815-16, the weather was particularly wet, and the temperature low, yet the public health was very good ; that intermittents and low fevers were very rare, even in marshy localities." The reason why disease did not develop itself as might have been anticipated under such circumstances, was in all probability mainly owing to an insufficient degree of heat, or it might be other unknown causes, to constitute a state suitable to the generation of fever, it previously being mentioned, that epidemics seem *to depend more upon a combination of causes than any particular one*. By way of example, supposing a given number of elementary bodies were to be placed together, and no change produced, yet on the superaddition of one or more such elementary principles a chemical action ensued, and by this a product be formed, dissimilar in all its appreciable qualities to any of the individual compounds, we should at once say such resulted from chemical laws—the laws of affinity—but how and in what manner the effect was performed, and why it required the superaddition of the last element or elements, would of course be inexplicable ; and so it may be with regard to those conditions entering into the constitution of an epidemic disease.

In the discussion of this part of the subject, it may be well, in a brief manner, to mention individually some of the allowed predisponents to epidemic diseases.

Climate exerts a powerful influence upon living bodies, and in various ways renders them liable to morbid conditions. Atmospheric vicissitudes, geological peculiarities, flat tracts of land, overgrown woods and forests, stagnant waters, the soil being of an argillaceous nature, thus retaining the moisture and producing the decomposition of organic matters ; situations that are confined, as creeks and narrow valleys, where the air is calm ; countries in which are extremes of heat and cold, with similar states, greatly determine the degree of salubrity or unhealthiness in a district. Sometimes it has occurred, after important changes have been effected in the

general features of a part, as by the clearance of underwood, drainage, and a better cultivation of the soil, that the climate has become altered in the most remarkable manner, and evincing such change the fevers previously witnessed in the country have assumed a different type. Bleak and exposed situations, by the judicious plantation of trees, may be rendered more healthy. In some of the kingdoms of Northern Europe, in which are extensive bogs and morasses, where the soil is highly impregnated with vegetable matters, it might be supposed that intermittents would be common, seeing that this class of fevers is generally associated with marshy districts; yet such is not the case, because the temperature of those regions is too low for the promotion of the putrescent process. Analogous to this, it has often been observed, during the prevalence of fevers in cities and large towns, that the setting in of frosty weather has abruptly arrested the ravages of a distemper. In different latitudes different affections prevail; in the north countries typhus, inflammatory conditions of the air-passages, rheumatism and tubercular complaints; in the tropics, intermittents, remittents, and dysentery.

Seasons and Weather undoubtedly enter into the epidemic causation, and different disorders predominate as they vary. In spring, small-pox, measles, and scarlatina; in summer, low fevers; in autumn, diseases of the mucous membrane of the alimentary canal; and in winter, acute affections of the fibrous tissues, and typhus fever, are common. In some parts of the world certain seasons of the year are regarded as infallibly productive of peculiar complaints. A friend of my own, who had travelled in most quarters of the American Continent, informed me that the inhabitants of New Orleans annually anticipated the "sickly season" with so much certainty, that it was usual for the merchants and others at that period to remove several hundreds of miles distant, returning when the unhealthy months had passed over. Seasons in an indirect as well as in an immediate manner operate in the induction of disease; viz., by rendering the crops deficient and deteriorating their quality, especially in insular and other countries, where the natives mainly rely upon the productions of their own lands.

Hippocrates in his time observed, that when the weather continued for a long period at one degree of temperature, not mattering whether of great heat or cold, then diseases were of less frequent occurrence, nor of so grave a character. During a long fit of dry or wet weather, a prevailing disorder will maintain an evenness in its symptoms, and if irregularities of temperature, etc., come on, the public health is more affected, and diseases will assume different features. In proof of this assertion, Tables IV., V., VI., and VIII. may be referred to. Table IV., which was compiled during the autumnal months, when biliary complications are most prevalent, shows that the number of jaundiced, or "yellow cases," as they were usually termed, ran so high as 1 in 8·91, being an average taken

from 330 cases then in the Edinburgh hospitals. In Tables V. and VI., taken about a month subsequent to the former, the number became less, being 1 in 11·42; in Table VIII., formed in the last month of December, 1843, a further decrease was observed to 1 in 16·07, and in Table X., drawn up in April, 1844, out of 80 patients labouring under the fever, only 2 of that number, being 1 in 40, were *yellow cases*. Here, then, we have an indisputable proof, that as the season and weather varied, the prevailing distemper altered in a corresponding ratio. It might be that electrical or other states were removed by a lower degree of temperature, or that certain impurities suspended in the atmosphere required the addition of heat in order to fully elicit their deleterious effects upon the body. High winds and tempests have been known to cut short a pestilential visitation. In a calm, stagnant state of the air, the effluvia which it contains will of course be more concentrated, while a gale of wind might so far dilute the poison as to render it innocuous.

The Decomposition of Organic Matters, by contaminating the air, powerfully predispose the body to disease; and when it is taken into account that the majority of the poor, especially in the cities and large towns, are almost constantly exposed to stench emanating from sinks, drains, and cesspools, which in those localities where they reside are mostly loaded with filth, and the general accumulations from an impoverished and redundant population, it becomes not a matter of surprise that fevers frequently in such places prevail, but that they do not rage in a much greater degree. To give the reader an adequate idea of the evils in question existing in Edinburgh, the following description may be quoted from the Poor Law Report of 1842. "We entered a dirty low passage," says the author, "like a house-door, which led from the street through the first house to a square court, immediately behind which court, with the exception of a narrow path around it leading to another long passage through a second house, was occupied entirely as a dung receptacle of the most disgusting kind. Beyond this court the second passage led to a second square court occupied in the same way by its dung-hill; and from this court there was yet a third passage, leading to a third court and third dung-hill. There were no privies or drains there, and the dung-heaps received all the filth which the swarm of wretched inhabitants could give; and we learned that a considerable part of the rent of the houses was paid by the produce of the dung-heaps. Thus, worse off than wild animals, many of which withdraw to a distance and conceal their ordure, the dwellers in these courts had converted their shame into a kind of money, by which their lodgings were to be paid. The interiors of these houses and their inmates corresponded with their exteriors." The foregoing quotation forms a most graphic account of the residences of the poor in the Scottish metropolis, and it might also with equal aptness be applied to Glasgow, Paisley, Dundee, and other towns in Scotland where the epidemic raged. From places to which the previous

description is applicable, three-fourths of the patients admitted into the Edinburgh Royal Infirmary and supplementary Fever Hospitals were brought. From Table VII. it is shown that the number was nearly two-fold greater, as we there see that 66 out of 80 cases, being almost seven-eighths, resided in streets, closes, and dirty wynds, similar to the places described; and in Table X., out of other 80 cases, no less than 55 came from like situations. In the Poor Law Report, to which reference has been made, the writer says that a vast population in the west of Scotland, when the kelp manufacture ceased, were reduced to the greatest want, "yet as their habitations were scattered, and in pure air, cases of fever did not arise among them." By constantly inhaling the putrid effluvia circulating in the atmosphere of those localities in which the poor dwell in the cities and large towns, the pernicious effects cannot fail to result in the production of disorder throughout the system, and when a distemper like the one to be described becomes manifest, how the predisponent in question will operate can readily be conceived.

Dense Population.—Where a number of individuals live crowded together in small and ill-ventilated apartments, the air becomes so vitiated as to be wholly unfit for the respiratory function. The oft-cited melancholy occurrence which took place in the Black Hole of Calcutta, is but the superlative degree of a condition, which in a comparative manner goes on in some of the hovels of the poor, in manufactories, prisons, etc., in this country. My friend, Dr. Renaud, informed me that during the Scotch epidemic of 1843-4, he visited a family in Grassmarket, and no less than *seven* individuals were laid ill of the distemper in a close and dirty apartment, which was not more than 8 or 9 feet square. Some of the common stairs in the large towns of Scotland form the general entrance to forty or fifty, and sometimes a greater number of inhabitants. At the termination of each flight of steps, are main entrances to internal passages or *lands*, as they term them, and on either side of these lands are small, badly lighted, and ill-ventilated apartments, one of which frequently serves as the night and day room to a whole family; in fact one of these wretched places constitutes the whole house. When a fever breaks out in these thickly populated dwellings, its extension becomes inevitable, and from such pestiferous situations innumerable patients were conveyed to the hospitals during the epidemic. The extreme poverty and wretchedness of the people who inhabit them, give no choice in regard to their dwellings or the locality in which they are placed, their destitute condition binding them as firmly to those places as the polype is united to its rock.

Insufficiency of food and clothing, with the want of the comforts and necessities of life, enter importantly into the epidemic constitution. That a bad and insufficient diet with any set of people is exceedingly favourable to an unhealthy condition of the body, is most undoubted, and cannot for a moment be the subject of hesitation. Whatever lowers the tone of vital action, whatever destroys

the physical powers, renders the system prone to the contraction of disease, and when such disease is contracted, morbid action becomes far less supportable. Amid a desponding and half-starved population, an epidemic attack is often attended with unusual severity, and scarcity of food has ever been regarded as a frequent forerunner of these visitations. Dr. Hunter says, "If other causes have slain their thousands, scarcity of nutritious food alone has slain its tens of thousands. My experience justifies and warrants me in affirming that, where people have not sufficient nourishment, there typhus manifests itself with all the horrors of a depopulating plague. Witness Ireland!" The evils insisted upon in an indirect mode are attended with destructive consequences; viz., by insidiously sapping the general health, and sowing the seeds of organic disease—as may be witnessed in the numerous forms of scrofula and other diseases, which in this country so fearfully swell the bills of mortality. Previous to the appearance of the epidemic in Edinburgh, hundreds of the poor had been in a state of positive destitution, and the various public charities had been inundated with applications for relief. Dr. Alison cites an instance where individuals had to live upon 4d. per week; a pittance so inconsiderable as to render it an enigma how existence was in any manner maintained. With those families with whom the greatest poverty existed, there the fever most frequently occurred. Where food was with such difficulty obtained, clothes and other necessities could scarcely be expected. In a cold and variable climate like that of Scotland, to be warmly clad is indispensable with the maintenance of health, and when such cannot be procured it becomes, like the former, a potent predisposing cause entering into the epidemic constitution.

Mental Depression.—Between the body and the mind there exists a sympathy so intimate that the evils inflicted upon the one cannot fail to be extended to the other. The mind being depressed renders the system exceedingly prone to take on morbid action, whilst, on the other hand, mental excitement endows the body with a certain repellent power by which it is capable of warding off disease. Great national calamities, political disasters, stagnation in trade, and the like, are often the prelude to ill-health, and the "strikes" of miners and manufacturers have not unfrequently been succeeded by febrile affections. The French revolution exerted the greatest influence upon public health, and was marked by several wonderful effects which it produced in the people. The testimony of military writers has repeatedly proved, that high mental excitement can prevent the inroads of disease and arrest its development; and the vanquished troops are always more sickly than their victorious enemies. Our unfortunate retreat at New Orleans too truly illustrates the fact. While the soldiers were engaged in active warfare the distemper which had previously existed amongst them was wonderfully checked; although the same physical causes to which they had been exposed, and that undoubtedly gave rise to the disease, remained in operation;

but after the decisive charge had been made, the day lost, and thus all buoyant hopes extinguished, then it was that the fever returned with unwonted severity, destroying many whom the sword had spared. The epidemics in Ireland have generally been preceded by some common calamity, and, did space allow, numerous instances might be adduced where these visitations succeeded general depressions of the public mind. Dr. Alison, in his "Observations on the Fever of 1843-4," has shown that the class of persons with whom the epidemic was almost wholly confined suffered under very great privations before the disorder became apparent; and that gentleman's facts, which he advances with respect to the poor in Glasgow, are quite in accordance with the data collected by myself in Edinburgh.

	Number examined.	In full work when attacked.	In partial work, "in- sufficient for sup- port."	Wholly out of work.	Totally destitute.
Glasgow Infirmary.	197	69	85	43	128
Havannah District.	163	53	83	27	110
Greenock Hospital.	76	13	53	11	63

In Table I., upon reference it will be seen that these results are quite in keeping with the facts ascertained in Edinburgh; viz., that by far the greatest number of the patients admitted into the hospitals in the distemper, were either wholly destitute or bordering upon destitution. In Table IV. it is stated, that out of 330, 146, *not one half*, were in constant work; 89 were partially employed, and 95 out of employ, so that 184 were unable to obtain a sufficient support. In Table VII., which gives particulars respecting 80 patients, 34 were in partial work, and 20 destitute, making 54, or more than five-eighths, who were labouring under the evils of poverty at the time of their attack. That such circumstances would act as a powerful depressing cause is most obvious, and there can be little doubt that the epidemic was much more general on account of this condition, which was so common amongst the lower orders of the large towns where it chiefly raged.

Contagion.—There are few subjects through the whole range of medical science admitting of so much diversity of opinion, and that have been disputed with such warmth, as contagion; and considering how important it is in a political and commercial as well as in a medical point of view, is any doctrine within the limits of the physician's inquiries more desirable of a correct decision, seeing, too, that an inclination to one side of the question or the other might involve the result of life or death? The accumulation of facts which from time to time might be collected, and a strict investigation being made relative to this point at each epidemic visitation, might perhaps have the happy effect of clearing up the inquiry, and satisfactorily settling a topic hitherto held in so much controversy.

Non-contagionists argue that fever may be generated by a combination of causes without the addition of a specific poison; but were we to sweepingly receive this opinion, facts would demonstrate that many unequivocal examples, powerfully arguing in favour of an opposite way of thinking, would have, if possible, to be got rid of, and unheedingly passed over. It is true that sometimes a sporadic case may occur, apparently under circumstances highly favourable to the extension of the disease, and yet such extension not take place. But how do we know that certain other elements entering into the causation, independent of those apparent, may not be wanting to form the epidemic constitution, and these of some subtle nature so as to escape detection, and elude the researches of experiment or otherwise; for instance (as mentioned before), electrical or other states of the air? Again, presupposing the requisite elements necessary for the epidemic constitution to be in existence, it might be that they would require blending in definite proportions, as we know such to be the case with regard to the laws of chemistry. Therefore, from these premises, we may conclude, that it does not necessarily follow, that every sporadic case (admitting the means whereby the specific poison might be communicated), occurring, as we have said, amid the existence of *apparent* causes forming the epidemic constitution, should become epidemic. The proposition which I would advance respecting this subject, is, *that states similar to those previously enumerated might cause an epidemic, yet they do not form the sole cause.* Why is it less probable that continued fever should have its prime origin in a poison *sui generis*, than that the virus of small-pox should be of a specific nature? We know that this disease existed in the world thousands of years ago, and in one part or another it has continued ever since. During the time of the Grecian Empire, small-pox was known, and that it was a disease which afflicted humanity in China and Hindostan, antecedent to the days of the ancient Greeks, there are good reasons for believing; yet who ever disputes its proceeding from a specific poison? Non-contagionists advance, that when a considerable time elapses, and a fever manifests itself, and no instance can be given whereby the poisons could have been communicated, that such a state of things would argue powerfully in favour of self-generation. We are aware, however, that the poison of some snakes, as also of rabid animals, will occasionally lie inert in the system for a considerable period, and then (when extraneous conditions and certain idiosyncrasies furthered its development) come into active operation. Professor Alison, in his lectures, used to mention two cases which had come under his observation, that well illustrate the fact under consideration. The first was that of a man who had resided in the fens of Lincolnshire; he removed to Scotland, and lived in a situation that was elevated and clear of marsh miasms, yet after the lapse of *four months* he began an intermittent fever. The second was that of a student, who had lived for some time near the Pontine Marshes

in Italy; he afterwards came to Edinburgh, and at the expiration of *nine months* he had an intermittent. If the poison which produces intermittent fever can lie so long dormant, and then come into active operation, why may not that which produces another form—namely, the continued—be subject to similar laws? Instances of shipwreck have occurred, where almost every acknowledged element entering into the epidemic constitution existed, yet no fever became manifest. Watson, in his Lectures on the Practice of Physic, quotes from the benevolent Howard, who says, “If it were asked what is the cause of jail-fever, it would generally be replied the want of fresh air and cleanliness; but as I have found, in some prisons abroad, some cells and dungeons as offensive and dirty as I have found in this country, where, however, this distemper was unknown, I am obliged to look out for some *additional cause* for its production.” In an account of the Island of St. Kilda,* the author mentions an instance powerfully supporting the doctrine of contagion. The clergyman, resident in the island, informed Mr. Wilson that on various occasions he had observed, when a boat arrived from the mainland, the little community had become affected with an epidemic catarrh, which was easily traceable to the fishermen belonging to the mainland boat. At the battle of Corunna, our soldiers were affected with a peculiar form of fever, similar to which no cases existed in this country, yet on the arrival of the troops, after the engagement, at some of our seaports—nurses, medical officers, and others, whose duties brought them in contact with the sick soldiers, contracted the same distemper. As to the fever of 1843-4, indubitable proofs were afforded of its contagious properties. Most of the medical officers connected with the Edinburgh Royal Infirmary and additional fever hospitals were seized with it; eight of the resident and clinical clerks in quick succession became affected, and out of that number no less than six were yellow cases, and thus obviously in danger of their lives. The majority of the nurses and domestics took the disease, and of the former at one time no less than nineteen were labouring under it. Some of the dispensary physicians, and other practitioners, took the disorder, as also several of the clergy, and visitors of the sick, whose duties brought them to the bed-sides of the patients. The few cases occurring amongst the higher classes, resident in the new town, were generally to be traced to the influence of contagion, the parties affected having had either immediate or indirect communication with those suffering under the disease.

Dr. Cormack, in his treatise on the fever, mentions an interesting fact, evidently proving that the distemper was communicable to remote parts, by means of articles of dress. “Mr. Nicolson, from the Island of Skye,” says the author, “one of my pupils, informed me that two reapers who had had the fever in Edinburgh, arrived in his neighbourhood after their return home, at the close of the harvest, when not a single case of fever had been seen in that

* Wilson's “Voyages round the Coast of Scotland.”

district. The mother of these persons, with whom they lived from the time of their arrival, was in a few days seized with the disease, and died." Being intimately acquainted with the gentleman from whom Dr. Cormack received his information, I made several other inquiries relative to the fact, and found that the identity of the fever thus imported with that form then raging in Edinburgh was undoubted. Were aerial and terrestrial, or similar causes, sufficient of themselves to produce continued fever, we could scarcely attribute the foregoing circumstance to mere chance. According to the doctrines of contagion, no individual in the whole island—out of the total population, amounting to more than 25,000—was so likely to become affected, as the mother of the parties who were then convalescents from the fever, who washed their linen, and was of course brought into immediate contact with the inmates; and, as might have been anticipated, she contracted the distemper.

Of the gentlemen resident in the Edinburgh Infirmary, who acted as the surgeons' assistants, none took the epidemic, although liable to the same local and common causes, as the clerks whose duties lay in the medical wards, but they had no communication with the fever patients, and were not exposed to the poison, which at once accounted for their immunity. In Glasgow, Aberdeen, Dundee, Paisley, Leith, and other towns, the most undoubted proofs were afforded of its being of a highly contagious nature; and, did space allow, innumerable facts might be adduced in support of the assertion.

II.—HISTORY.

The first appearance of the epidemic in Edinburgh may be stated as occurring in February 1843; nor could I learn of any cases prior to this date becoming manifest in that city, although it was said to have been noticed in Glasgow so early as the month of December in the previous year. A short period elapsed before particular attention was directed to the disease in question, some physicians at the onset regarding it as an unusual form of synocha, others considering it a mild description of typhus. The numbers, however, who were thus oddly affected increasing, the uniformity of the symptoms, and these of an anomalous character, soon led the hospital and dispensary physicians into a strict inquiry as to its nature and singular characteristics. From the novel pathognomonic distinctions which it presented, it was quite impossible to refer it to any nosological classification, nor had any of the faculty in Edinburgh, not even those most advanced in years, ever witnessed a similar disorder. Sydenham, in his time, experienced no little difficulty in properly classifying the various epidemic visitations which he has recorded, because, as they occur but seldom, sometimes many years intervening between two important attacks, the life of any one individual is too brief in order to arrive at any definite conclusions from personal observation. Some of the older

authors imagined, that epidemics of an identical nature returned again in the cycle of their revolution, but at uncertain periods of intervention, that being as soon as the requisite condition necessary for their generation existed in the air, an element to which they mainly attributed their origin; but as there are many other agents besides the constitution of the atmosphere which importantly influence their production, this idea becomes fallacious and untenable.

Table No. III. shows the rapid manner in which it progressed in the Edinburgh hospitals, and by it will be seen that on the 20th March, 1843, the total number of fever patients amounted to 82; on April 3rd, 89; May 1st, 95; June 29th, 117; and by July 1st, they had increased to 206. Thus did the numbers continue to become greater until November 20th, when there were no less than 478 fever cases accommodated in the Royal Infirmary and Supplementary Fever Hospitals. At this period it might, in Edinburgh, be considered at its maximum, the admissions at the hospitals affording a correct idea of its prevalence throughout the city. Upon reference to the records of the Royal Infirmary it appears that from October 1842 to February 1843, the highest monthly number varied from 53 to 74, and in the months of May, June, and July, 1842, the aggregate number of fever patients was respectively 76, 56, and 55, which if compared with the same months in the succeeding year, will show the great preponderance of the latter over the former. From July 1st, 1839, to October 1st, 1841, the total number of fever patients amounted to 2,247, including the febriculae, the mildest form of fever. In six months, terminating on the 31st of January, 1844, there were no less than 3,162 cases of fever admitted into the Edinburgh hospitals, and innumerable applicants during that period were refused admission. Such an exceedingly great demand for accommodation in the public institutions of the Scottish metropolis is, perhaps, without a precedent at any previous period. The monthly average of admissions during the time when it was most prevalent varied from 531 to 638. I will here, however, insert the following table, that I copied from the books of the Royal Infirmary for Dr. Alison, and which the Professor inserted in his pamphlet, published on the epidemic, in May 1844.

The numbers admitted into the hospitals each month respectively, from September 1843 to April 1844, with the previous average:—

1843.	No. admitted.	Previous average.
September	531 . . .	87
October	638 . . .	98
November	586 . . .	121
December	544 . . .	130
1844.		
January	465 . . .	129
February	300 . . .	90
March	256 . . .	93
April	93 . . .	77

In July one or two extra wards were opened especially for fever, and quickly filled; the applications for admission were every day more numerous, and it became obvious to the managers of the Royal Infirmary, that unless some steps were taken for additional accommodation, the calls of the many applicants who thronged the waiting-room would have to be unavoidably deferred or altogether denied. Under the unwonted pressure of circumstances like these, at a meeting holden by the Board, it was resolved that 20 or 30 beds should be fitted up in a spacious hospital, then empty, in Surgeons' Square. In two or three days these were filled, and by the 8th of August the total number of both sexes in that establishment alone was no less than 55, and in a few days subsequent to that date had increased to 85. On the 21st of August another house in Surgeons' Square was prepared for the reception of patients afflicted with this disease (Fever-house B), in which it was found that 30 beds could be put up, and this place also a few days sufficed to fill. Table No. II. gives the exact numbers in the various establishments at this period.

TABLE II.—*Fever Cases admitted into the Royal Infirmary during the month of August 1843.*

Males	.	.	.	.	.	141
Females	.	.	.	.	.	110
						<hr/>
						251

Fever Cases, admitted into Fever Hospitals B and C, Surgeons' Square, during the month of August 1843.

Males	.	.	.	.	.	62
Females	.	.	.	.	.	79
						<hr/>
						141
Cases in the Infirmary	.	.	.	.	.	251
						<hr/>
Total	.	.	.	.	.	392

Owing to the continuance of applications it became indispensably necessary to make even yet further provision. In the middle of September the managers entered into a contract for the building of a large shed or temporary hospital, to be erected in the grounds of the Royal Infirmary; this being of sufficient dimensions to contain 50 or 60 beds. In less than a week after its completion it also had received its complement, and on the 15th October the number which it contained amounted to 55; and the total of fever patients now in the various hospitals had advanced to 452, as may be seen upon reference to the subjoined table, which gives the exact number of fever cases on the first day of every week, from January 2nd, 1843, to June 3rd, 1844.

TABLE III.—*Showing the aggregate number of Fever Patients in the Royal Infirmary and extra Fever Hospitals, on the 1st day of every week, from January 2nd, 1843, to June 3rd, 1844, inclusive.*

January 2 . . . 61	September 25 . . . 469
" 9 . . . 64	October 2 . . . 471
" 16 . . . 82	" 9 . . . 443
" 23 . . . 80	" 16 . . . 452
" 30 . . . 73	" 23 . . . 443
February 6 . . . 71	" 30 . . . 431
" 13 . . . 76	November 6 . . . 458
" 20 . . . 83	" 13 . . . 467
" 27 . . . 80	" 20 . . . 478
March 6 . . . 71	" 27 . . . 465
" 13 . . . 89	December 4 . . . 471
" 20 . . . 82	" 11 . . . 451
" 26 . . . 75	" 18 . . . 470
April 3 . . . 89	" 25 . . . 463
" 10 . . . 85	1844.
" 17 . . . 87	January 1 . . . 453
" 24 . . . 87	" 8 . . . 466
May 1 . . . 95	" 15 . . . 433
" 8 . . . 104	" 22 . . . 431
" 15 . . . 108	" 29 . . . 440
" 22 . . . 105	February 5 . . . 413
" 29 . . . 117	" 12 . . . 411
June 5 . . . 112	" 19 . . . 382
" 12 . . . 123	" 26 . . . 357
" 19 . . . 120	March 4 . . . 338
" 26 . . . 112	" 11 . . . 322
July 3 . . . 125	" 18 . . . 279
" 10 . . . 135	" 25 . . . 265
" 17 . . . 165	April 1 . . . 230
" 24 . . . 198	" 8 . . . 205
" 31 . . . 206	" 15 . . . 188
August 7 . . . 229	" 22 . . . 147
" 14 . . . 280	" 29 . . . 133
" 21 . . . 294	May 6 . . . 105
" 28 . . . 306	" 13 . . . 105
September 4 . . . 352	" 20 . . . 96
" 11 . . . 371	" 27 . . . 102
" 18 . . . 420	June 3 . . . 97

About this time a fever hospital was established in Leith for the reception of patients in that quarter; nevertheless the applications at the Edinburgh hospitals were, unfortunately, great as ever; and it not unfrequently happened that fifty or sixty tickets for admission had unavoidably to lie over until the succeeding day. There were at one time no fewer than a hundred applicants at the hospital when every ward and bed were completely filled—a circumstance

probably unprecedented in Edinburgh: and from the accounts given of the fevers which visited the city in 1817-1820, 1826-1828, 1837-1838, or 1839, assuredly nothing like it appeared in those epidemics. Upon reference to the records of the great epidemics that have, during the last thirty years, prevailed in the Scottish metropolis, the numbers afflicted were never nearly so great as in the fever of 1843-4. In 1817-1819 (two years), the aggregate is stated at 2·470; in 1827, they were 1·837; and in 1828, 1·862; but, as previously asserted, during the last visitation, the totality of eight months was so great as 3·162! The public dispensaries were equally inundated with requisitions for attendance upon the poor at their own homes; and those gentlemen who were in the habit of visiting them in different parts of the city gave the most melancholy accounts of the prevalence of the disease, and the utter destitution in which it had placed both individuals and families. Scarcely a common stair or house in the Canongate, Cowgate, Grass-market, West Port, and the various closes and wynds, but there the disease was present, or had recently existed. In Paisley, Glasgow, Dundee, Aberdeen, and other large towns in Scotland, similar accounts were given; and in those places, as in the metropolis, it was chiefly, if it might not be said wholly, confined to the dirty, ill-ventilated, and most noisome localities, the invariable residences of the poorest and most destitute class of the inhabitants. A gentleman who had visited Glasgow during the prevalence of the epidemic, stated that the pressure of applicants for admission at the hospital was equally great as in Edinburgh, and it there too became quite impossible to answer the innumerable calls for entrance into that institution. Nearly every close, wynd, and pent-up street of that city was the scene of the disease, and the pictures of misery presented amidst the poor who peopled them were of the most distressing description. In damp and badly-lighted cellars, where the atmosphere was loaded with humidity and impurities, upon beds of straw, with an insufficient covering, and scarcely the common necessities of life, whole families were to be seen labouring under the distemper. Those who were far advanced in life asserted with assurance that during the previous half century there never was known in Edinburgh so great a number of persons ill at one time as in the autumn of 1843. That this city has at various periods been afflicted with severe and fatal visitations of this kind is true, and the mortality may have been much greater, but the extent of misery resulting from an affection so general is almost without a parallel; and the same observation might, with equal correctness, be applied to the large towns above mentioned. The epidemic of 1817-20, when Queensbury House, in Edinburgh, was opened for the reception of fever-patients, is well remembered as an alarming visitation from its extent of affection, yet we know that the numbers who took the disorder in the attack of 1843-4 were doubly greater than the former. The House of Refuge, and the workhouse, were, like the

hospitals, overwhelmed with applications for admission; the public charities could scarcely in any manner meet the numerous calls upon their bounty, and their weekly expenditure became trebled in amount. The Destitute Sick Society, in their Report, stated as follows:—"If an overruling Providence do not interfere, an amount of outlay will be imposed on the Society which it is impossible to calculate; nor is it likely that the public subscriptions will adequately meet the pressing and still growing demands." Thus, all institutions founded for the poor and afflicted were in a like predicament from an overflow of applicants beseeching their assistance; and had matters gone on but for a little time longer in the same manner in which they progressed for several months, it is quite impossible to say how heightened would have become the scenes of misery, or what would have been the consequences.

At the close of the summer some persons offered an opinion that the disease chiefly existed amongst the Irish labourers, who annually come to Great Britain in search of agricultural employment; an argument, in all probability, ingeniously concocted by those parties who contribute little or nothing towards the general maintenance of the poor, and feel afraid lest an impartial and equitable assessment should be imposed upon them. Were well-digested legislative enactments brought into operation with regard to the poor in Scotland, there is great reason to believe that the epidemic visitations which are of such frequent occurrence in the cities and large towns of that division of the empire, would become more rare, and thus not only be the prevention of incalculable misery, but positively decrease the amount of mortality. On reference to Table No. I., it is seen that out of a hundred and fifty patients, twenty-five only were Irish; and when it is taken into consideration that many, if not the majority, of these had come into the city in good health, and, by lodging in houses and localities where the disease prevailed (as I ascertained to be the case), had contracted the disease, the supposition that it was much restricted to, or caused by the influx of the Irish, is manifestly unfounded. That this class of individuals did not import the fever into Edinburgh or Glasgow appears very probable from the fact of the distemper having been observed in those places during the winter months—a season, above all others, at which the labourers belonging to the sister kingdom do not come to this country in search of employment. There is one circumstance, however, pretty certain, that the migratory habits of these people during the time of the harvest had not a little to do with spreading the epidemic over the agricultural districts; for it being a contagious distemper (of which, as previously stated, there were the most undoubted proofs), and their lodging amongst the poor in the various towns where it raged, the infection was thus most assuredly conveyed to remote parts. According to data collected subsequent to those given in Table I., the proportion of Irish became somewhat greater, which may be seen as under.

TABLE IV.—*Giving particulars respecting 330 cases of fever that were in the hospital in the month of October 1843.*

Scotch	256	1 in	1·29
Irish	63	1 in	5·24
English	11	1 in	30
Males	159	1 in	2·07
Females	171	1 in	1·93
Married	152	1 in	2·17
Unmarried	178	1 in	1·85
Natives of Edinburgh	177	1 in	1·86
Resident 14 years in do.	32	1 in	10·31
Resident 3 years in do.	34	1 in	9·7
Epidemic	320	1 in	1·03
Genuine typhus	10	1 in	33
True typhoid measles eruption	10	1 in	33
Yellow cases	37	1 in	8·91
Fully employed	146	1 in	2·25
Partly employed	89	1 in	3·07
Out of employ.	95	1 in	3·47
1 Relapse	167	1 in	1·97
2 Relapses	29	1 in	11·28
3 Relapses	5	1 in	66
4 Relapses	1	1 in	330.

Out of 330 cases of fever in the hospitals, during the middle of October, 63 were Irish, being 1 in 5·24 of the aggregate, and 11 were English, being but 1 in 30. As the year advanced the disorder seemed to extend itself into the country, numbers of patients being brought from Dunbar, Haddington, Pennicuik, Musselburgh, etc., so that it was not now, as at the earlier parts of the season, confined to the cities and large towns, but had become extended to the provinces.

A new fever presenting itself, as may be supposed, it ere long attracted a host of investigators as to its positive nature, and at the various medical societies in Edinburgh the subject was fully and freely discussed. Some physicians considered it a modification of typhus, and others stoutly contended for its arising from a poison specifically different from that which produces the usual forms of continued fever observed in this country. Dr. Christison, at one of the meetings of the Medico-Chirurgical Society, expressed his opinion with some positiveness that the epidemic of 1843-4 so nearly resembled the fever of 1817-20, described by him in Tweedie's "Library of Practical Medicine," as to leave no doubt as to their identity. The Doctor, however, acknowledged that he had seen but a very limited number of cases in the recent epidemic, and probably his conclusion was in some degree arrived at from the accounts of others whose opportunities for observation had been more extensive. With all deference to so high an authority as Dr. Christison, there were many and important disagreements

between the two, though in certain respects an undoubted similarity existed. The relapses in the fever under description were far more frequent, the yellow cases more numerous; the distemper of 1817-20, according to Welsh and others who recorded it, was of a much more inflammatory type, and required more depletive treatment, with other dissimilarities, at once disproving their positive identity. Dr. Henderson, in an able account which he published pointing out the difference between it and the genuine typhus, says:—"The epidemic began to prevail in February 1843, and the very first case that came under my notice I distinguished at once as widely different from every form of fever that I had previously seen." Professor Alison ultimately expressed his conviction of its being a NEW DISEASE, though at the first he was not so fully satisfied as to that point. The subsequent facts, to be detailed, will, I trust, remove every doubt as to its not being a new disorder. Welsh, in his "Treatise on Blood-letting in Fever," says, that in the epidemic of 1817-20 instances were observed where the same individual had as many as three distinct attacks in the course of a few months. Again, he remarks, "I believe that several of the nurses in the Royal Infirmary had a second attack." Several cases came under my own notice where persons had a repetition of the disease in the course of a few months, but I do not remember any instance where one individual had three attacks, as mentioned by the author above cited.

There were undoubtedly some considerations which led to the supposition that the epidemic bore certain resemblances to the suette, or sweating fever of Normandy. In a few instances, though these were of very rare occurrence, the epidermoid tissue was raised into vesicular eminences, varying from the size of a millet-seed to the section of a small pea, these vesicles containing a transparent fluid and quite unattended with any areolar blush; on the third day they became shrivelled and opaque, and were desquamated in thin furfuraceous scales. From the occasioned presence of these bullæ with other nosological characteristics, some degree of similarity certainly was manifest between it and the suette. There were physicians who endeavoured to show its near alliance to the yellow fever of the West Indies, indeed, gave it as their opinion that, in some respects, there was a positive identity between the two, only that the epidemic prevalent in this country had become greatly modified by climate and other circumstances calculated to alter its general features. When we take into consideration the usual number of yellow cases,—that in Dundee there were several instances of black vomit, though in Edinburgh I did not see more than two or three cases, together with certain less important correspondent symptoms, we are compelled to admit that the assertion is not wholly unfounded; no trace of its importation to Scotland, however, could be found, which has generally been done where yellow fever has been communicated from one country to another.

In 1793, Chisholm traced the yellow fever into the island of Grenada, and numerous cases are upon record where ships have conveyed the disorder from one remote part to another. Some of the physicians in Glasgow (who espoused this opinion), at one time imagined that it had been first imported into that city by merchant vessels coming from the West Indies; this idea, however, was more fanciful than real, no facts being adducible to attest the truth of such allegation. Dr. Spittal of Edinburgh pointed out a likeness between it and an epidemic that occurred in Greece near three thousand years ago, and according to the description given by the ancient writer, in certain particulars they may be said to resemble each other. From the various histories of Irish epidemics which have from time to time been the scourge of that kingdom, some of those attacks seem to have been very much like the epidemic now under consideration, particularly the fever of 1818-20, which from the almost universality of its crisis occurring on the fifth day, was termed by the vulgar *the five days' fever*, and that disorder, like the affection of 1843-4, nearly always resolved itself by a well-marked and copious diaphoresis. O'Brien, who gave an account of the Dublin epidemic of 1826, mentions nosological characters of that disease which evince a decided resemblance to the one now described. The author says, "It was distinguished by its short periods, terminating in three, five, seven, or nine days, but the second of these periods was the most frequent. The person previously in perfect health would be seized with sickness at the stomach, headache, pain in the small of the back, and chilliness. On the approach of the evening all these symptoms increased, and the febrile paroxysm was formed, the chilliness increased to a rigour, the nausea to vomiting which harassed the patient during the first three or four days of his fever, in the form of an empty straining, and frequently continued through the whole course. On the evening of the fifth or seventh day the exacerbatio critica commenced, which, mostly with the intervention of a rigour, but very frequently without this symptom, terminated in a profuse perspiration, which continued through the night, so that on the following morning the crisis was complete, and we generally found the patient convalescent."* These particulars, relative to the Dublin fever of 1826, tally so nearly with the account to be given of the pathological characters of the epidemic under discussion, as to warrant the statement that no febrile disorder of recent occurrence, in the mode of its attack and resolution at least, bears so striking a resemblance; only that the fever of 1843-4, instead of resolving itself on the fifth day, for the most part had its crisis on the seventh; therefore it might be termed the *seven days' fever* (Tables No. V., VI., and IX.).

Had the disease been of a more malignant nature, and thus requiring greater care and attention in its treatment, the results could not have failed to have been of a very calamitous description,

* Cormack "On the Fever of 1843," p. 101.

the numbers affected being so considerable that it was quite impossible for the unfortunate persons who were unable to gain admission at the hospitals to procure the requisite medical attendance; luckily, however, active remedial means were not in the majority of cases indicated, and many went through the disorder without any medical attendance whatever. There can also be but little doubt, that if sufficient hospital accommodation had been readily provided at the very outset of the attack, it would never have become so general in Edinburgh. As it was, from the limited provision in the public institutions, innumerable persons were obliged to remain at their own homes, often amid a numerous family, in apartments and localities densely populated, and in every other respect highly fitted for the propagation of a distemper; hence in a great manner was the mode in which it became so prevalent. Many instances were observed, where an individual became affected, and from being obliged to lie in the same room with the rest of the family, every other member subsequently took the disease. Again, the afflicted on remaining at their own homes were visited by friends and neighbours, who communicated the distemper to other and distant parts of the city, and with these, in like manner, similar circumstances operated in its diffusion; hence, it is unquestionably obvious, that a prompt outlay on the part of the civic authorities, and the charitably disposed, on the appearance of the first cases, would not only have saved much expense, and called for a less demand on their bounty, but would at the same time have been the prevention of incalculable misery, and in a summary manner tended to check its ravages.

Upon interrogating the patients as to the cause of their attack, they for the most part ascribed it to wet, cold, or contagion, and could generally remember some particular period when one or more of these assigned causes had been in operation. In Table No. VII., out of 80 cases, 28 (1 in 2·85) referred this affection to contagion, 17 (1 in 4·7) to wet, and 13 (1 in 6·15) to cold. Those who imagined that they had contracted the disease by means of contagious influence, would frequently mention their having visited a friend or relative labouring under the disorder, or, what was more generally the case, assert that the distemper was raging in intimate proximity with their dwellings. The two latter causes, viz., wet and cold, had for the most part immediately preceded the accession of their attack, and were consequently adduced as the only reasons they could suggest giving rise to their affection. Most writers upon fever, especially those who have recorded great epidemics, notice the fact of patients attributing their malady to the foregoing causes; and when we consider what a powerful excitant the effects of cold form, and the unequivocal proofs that are so frequently afforded of contagious and infectious influence, the conclusions thus arrived at seem very plausible inferences. When the system has contracted an infectious matter which may for some time lie latent, any debilitat-

ing or depressing influence may so affect the body as to act as a proximate cause, and thus develop the impending disease; and perhaps few, if any, causes are more calculated to act as an excitant than cold. We are aware that a convalescent from fever will on exposure to cold have a relapse, and such relapse be marked by a very near repetition of the primary symptoms, yet we are not to conclude that cold, *per se*, can produce fever, however the vulgar may protest, and coincidences seem to favour the supposition; but we must merely regard it as a proximate cause, though perhaps one of the most powerful in the induction of fever. Sir Henry Marsh was of opinion, that "cold like contagion is an impression made upon the sentient extremities of the nerves." Thus, there being conveyed a positive sedative effect to the great nervous centres, the whole system becomes depressed, and such depression necessarily constitutes a state highly favourable to the development of the febrile phenomena. Fear, by producing like effects, is attended with similar results; hence it not unfrequently happens that those persons who are exceedingly afraid of contracting a prevalent distemper are the first to become its victims.

Females were more frequently affected than males, and both sexes, when under puberty, seemed to be less susceptible of its infection than adults. In Table No. IV., out of 330 cases at one time in the hospitals, 171 were females, and 159 males; Table No. VIII., which gives particulars respecting 450 cases taken in January 1844, shows that out of that number 240 were females, and 210 males, being a majority of one-fifteenth of the former over the latter; in Table No. IX., 24 were females, and 16 males; in Table X., 45 were females, being 1 in 1·77, and 35 were males, being 1 in 2·28; in Table XI., out of 159 patients, 91 were females, and 68 males; and in Table XII., out of 32 patients, no less than 26 are females, and only 6 males; thus out of 1,091 cases above mentioned, 597 were females, and 494 males, the former exceeding the latter by a fraction more than ten per cent.

From twenty to forty years of age appears to have been the period at which the greatest liability to the disease existed, as in Table No. VII. it is shown that out of 80 cases one half were during that period, and only one-fourth of the aggregate were under twenty years of age; 18, or 1 in 4·44, were from forty to sixty, and but 2, or 1 in 40, were above sixty. In Table VIII., out of 450 cases, 130, or 1 in 3·46, were under twenty years; 217, or 1 in 2·07, from twenty to forty; 85, or 1 in 5·29, from forty to sixty; and 18, or 1 in 25, were sixty years and upwards. In Table IX., out of 40 cases, 6, being 1 in 6·66, were under twenty; 26, being 1 in 1·53, were from twenty to forty; 7, or 1 in 5·71, from forty to sixty; and 1 above sixty. In Table XII. out of 29 patients whose ages were ascertained, 12 were under twenty, being 1 in 2·41; 13, from twenty to forty, being 1 in 2·23; and 4 from forty to sixty, being 1 in 7·25. Thus in an aggregate of 588 cases here given, the average runs as

follows:—168, or 1 in 3·5, were under twenty years of age; 296, or 1 in 1·98, were from twenty to forty; 104, or 1 in 5·65, from forty to sixty; and 21, or 1 in 28·95, were sixty and upwards. Hence we see that nearly half of the whole number came under the second period (from twenty to forty), which is an interesting fact, when it is considered that such is arrived at from well-nigh 600 cases; and shows that in this fever the affection was generally observed as occurring during a particular time of life.

III.—PATHOLOGY.

The fundamental pathology of fever is very imperfectly, if at all, understood, whilst the various and conflicting theories which have at every period been propounded as to the prime seat of the affection, instead of elucidating a long disputed question, and decisively settling a subject of contention, that has, both in this and other countries, produced innumerable learned dissertations, and elicited many warm discussions,—those theories have, from the many and apparently cogent arguments put forth defensive of favourite doctrines, only intended to render more intricate and doubtful a matter still fraught with more than common difficulties in its solution. Those who are at all acquainted with the literature of this particular part of the subject now treated of, must be well aware of the perplexities and obscurity in which it is involved, and the desirableness which there is, that our knowledge, not only respecting the fundamental principles of the pathology, or as Bateman terms it “the essence of fever,” but also as to those conditions requisite for the production of the proximate cause, were more accurate and indisputable; so long, however, as the great diversity of opinion, and the want of demonstrative proof, which there are on these points, exist, thus long will our notions not only as immediately regards the curative measures, but as to other important considerations in the establishment of a precise and definite acquaintance with its true nature and phenomena, be based upon no fixed and legitimate principles, but reared upon uncertain and hypothetical grounds; nor is it without a full consciousness of these facts, and a thorough conviction of the difficulties which beset it, when a brief advertence is made to the question, as engaged in the subject.

In any matter of scientific inquiry, where inferences can only be arrived at by mere theoretical reasonings, very dissimilar, nay, positively opposite, notions are sure to be entertained, because, as the deductions are then formed according to some particular hypothesis presupposed by the reasoner, and as different original inquirers may take up different fundamental views, so must the results come to in like manner vary; and thus it has been and continues to be, with regard to certain branches of philosophy where substantial facts and irrefragable evidence are not producible.

Whatever our information may be relative to the true nature

of febrile diseases, it is abundantly evident that very much is still to be acquired before we become satisfied that we are possessed of positive conclusions—conclusions upon which the superstructure of a rational treatment is to be based, and it is repeated while our dubiousness as to many essential considerations exists, so long shall we feel perplexed and baffled in the endeavour to guide the disease to a successful termination. No better proof can be given of the unsettled and indefinite knowledge which we possess regarding fever, than that almost every author of eminence fosters opinions at variance with other writers, and that scarcely any two physicians who have set themselves up as authorities are unanimous on all points. When we take into consideration that from the remote times of Hippocrates down to the days of Hoffman and Cullen, some of the first and most inquiring minds that ever adorned any department of science have exerted their best energies in the laudable endeavour to build up a true and an incontrovertible doctrine as to the cause of fever, and that amongst such illustrious individuals the greatest discrepancy and the most diametrically opposed opinions have been entertained, we become impressed with the conviction that on some of the abstruse points in medicine our knowledge is exceedingly crude and imperfect, and that philosophical investigators have yet very much to discover. When we reflect how impossible it is in the course of fever to prognosticate with any degree of certainty the supervention of particular symptoms; in what order they shall be observed; which precede or succeed each other; the degree of intensity by which they shall be characterised; which is the primary affection, and which is the secondary; that dissection not unfrequently reveals lesions that were quite unsuspected; that death occasionally supervenes where the morbid conditions of the organs necessary to vital existence are not at all calculated to induce a fatal result, that is, according to the best of our opinions relative to such morbid states; how unfrequently our wisest discrimination is, or appears to be, totally fallacious; and that the greatest care and apparently the most correct judgment displayed in the treatment seem abortive and erroneous—when we reflect upon these facts, we are painfully reminded that our knowledge respecting the radical principles of the disease is exceedingly limited, and that the greatest inducements are held out for the attainment of more positive intelligence to direct our practice.

All information to be gained not only of this affection, but as regards diseases in general, is reducible into one grand consideration; viz., to empower us with the means of averting the tendency to death, whether immediately or indirectly, which can only be done by arresting anormal action in the vital organs properly so called, and this must be effected before such structural changes take place, as are necessarily followed by a cessation of the vital functions; hence if we can gain a clear and succinct

knowledge of what those anomalous actions are in their incipient state a most important difficulty would be overcome, all diseases being far more capable of cure at the outset than they are when in an advanced condition. In fevers, as stated, grave changes may be going on in some visceral organ which do not present symptoms sufficiently prominent to warn us of their existence, at least we are not in the present state of medical science possessed of the kind of knowledge which is requisite for their detection; and it is indeed surprising, when we consider that so many centuries have passed since philosophers first turned their attention to the study of this class of diseases, that our information respecting febrile affections is so vague and inconclusive. Whatever may be the cognisable appearances of morbid action on dissection of the vital organs properly so called, from inductive reasoning we are bound to admit that the nervous power proper to those organs is in some manner primarily vitiated, but in what such vitiation consists we cannot decide, and if we could but know what was the actual diseased action, and from what condition or combination of states it proceeded, the evils resulting from the consequent disorder of the other functions, viz., the circulatory, secretory, and excretory, which are intimately dependent upon the former, might perhaps be much more readily averted.

The nervous influence proper to the vital organs being disordered previous to that which takes place in the functions of circulation, secretion, and excretion, which, as just enumerated, are the invariable sequents in the circle of diseased actions which operate in febrile diseases, it follows as a rational inference that the morbid conditions resulting immediately from the latter functions will be precisely commensurate with the degree of intensity of the former; viz., that of the nervous function. The observable phenomena of fever, then, are directly dependent upon the morbid condition and altered action of a certain organ or organs, and the degree of intensity with which such organ or organs may be affected, determines the general character of the fever, and renders it of a mild or an alarming description. Thus far are we possessed of information relative to the phenomena of fever; viz., that the nervous and sensorial functions in the series of changes which constitute the febrile affection, precede the disorder of the other functions, but whether the nervous function be in an occult manner primarily affected by a vitiated state of the blood, as some theorists have contended, we cannot determine, this being the *questio verata* hitherto undefined.

The humorists, the solidists, and the chemical pathologists,* have each endeavoured, and some with great ingenuity, to support their respective notions, yet if we espouse the one or the other of their doctrines, the etiological deductions arrived at, even with those that seem to bear the greatest semblance to truth, may be assailed by

* Paracelsus, Van Helmont, Campanella, etc.

many and unanswerable objections—objections that in no slight degree invalidate whichever way of thinking may be adopted as the most plausible and correct. When the physician is called to a case where the febrile symptoms are of an inflammatory order; for instance, when the brain and its members are affected; when he sees a dry and parched tongue, a glossy ferocious looking eye; when the skin is hot and burning, the pulse quick and strong; the urinary excretion high coloured, and voided in decreased quantity, with other symptoms of excited vascular action,—he favourably reviews the solidal theory. At one period the solidal theory was much more regarded than any other in the continental schools, and especially in France; since the views of Broussais, Louis, and his pupils, and some others, the tide of public opinion has greatly turned, and is still progressing in favour of the humoral pathology, showing the vacillation and uncertainty yet existing on the subject. If on the other hand a patient be observed labouring under the highly congestive form of the disease, where there is great prostration, a livid pallor of the countenance, diminution of animal heat, a small and compressible pulse, the lips and teeth covered with sordes, petechiæ and vibices scattered over the surface, with an obvious tendency in the whole system to run on to a state of putridity—the humoral doctrine then appears far from being incorrect. To draw the line of demarcation, however, between what may be termed a humoral or a solidal pathology is obviously extremely difficult, for if the location of the primary morbid action be assigned to the capillary extremities, it is impossible, so far as our means of observation allow, to positively affirm where the one terminates or the other commences; in fact, the matter there, according to the best inferences to be drawn by our senses, becomes of homogeneous structure; hence those commonly received notions, which are founded upon a positive division between the solids and fluids, are strictly speaking according to the rules of physiology a mere arbitrary distinction; an assumption that cannot be borne out by ocular demonstration or any invasive proof. In support of the foregoing assertion the following passage from Andral may be appropriately cited. “The division of the parts of the body into solids and fluids,” says that eminent morbid anatomist, “seems to be a distinction of small importance, and that is not always just, since it ceases to exist in the intimate structure of the organs, in which all the grand vital phenomena take place, and in which also occur all the vital changes which constitute the vital state.”

There is one thing, however, quite undeniable, that disease must exist in one or the other of these, and perhaps the most correct assertion would be that it is situated in both; at least we find that in its course both fluids and solids evince unequivocal symptoms of diseased action; but to which may be assigned the priority, as previously said, we are not enabled to determine. The humoral theory was the first given to the world,

and until the middle ages was implicitly received by the Arabian and other physicians who flourished at those remote periods. The philosophic mind of Galen so firmly believed in the Hippocratic doctrine, that he not only subscribed to the opinions of his great archetype, but endeavoured to extend his views and establish their truth. When the ancients observed cases of fever of the highly congestive form, when they beheld the excretions so vitiated, with a general evidence of a proneness in the system to pass on to putridity, we may readily suppose that they would deem the humours of the body as the chief seat of the disease. When we consider the manifest disadvantages under which they laboured in those distant periods; that their knowledge of the human frame was merely an inference deduced by the comparison of the lower animals, and not founded on any real observation in itself; that the grand discoveries respecting the vascular and nervous systems—systems upon which the vital functions immediately depend, were unknown; and that the light which other branches of philosophy in latter times has diffused explanatory of many mysteries which at those remote periods were obscured by the dark ignorance of the age—when we consider these facts it is scarcely to be wondered at that many of their notions have become exploded, and that more recent opinions are held in higher respect, where demonstration and proof can be brought to bear confirmative of theoretical argumentation.

In important epidemic visitations, where great uniformity has been observed in the distinguishing symptoms of the disease, where after death the lesions were found of one description, together with a sameness in the general phenomena presented, physicians have then been led to incline most to those doctrines promulgated by the schoolmen, which seemed to evince the closest resemblance to the facts under observation. If the brain and its membranes were found injected, and giving traces of inflammatory action, the views of Grandoilliers, Wendelstadt, Plouquet, and Clutterbuck have attracted their converts; if much other visceral complication, the deductions of Stahl, Juncker, Sprengel, Armstrong, and others have been held in estimation; and if the mucous membrane of the digestive canal were found much affected, the opinions of Rhan, Prost, Baillie, Louis, and Broussais, especially the last mentioned, who has so zealously endeavoured to found this theory, have been esteemed.*

Many of the conclusions arrived at, however, even by those who have set themselves up as the establishers of an original doctrine, are exceedingly unphilosophical and based upon tottering principles, their promoters having erred because they built up a new theory, and subsequently tried to supply the facts corroborative of certain views, instead of first studying attentively the operations of nature, and then endeavouring to account for the manifested phenomena on the pure principles of demonstration and science. One of the older writers, who was impressed with this conviction, says: "The distribu-

* Bonetus, Bartholinus, Petit, Serres, Bretonneau, etc.

tion of distempers into kinds is commonly done to serve some hypothesis founded upon the true phenomena, and hence this distinction is rather adapted to the bent of the author and his manner of philosophizing, than to the nature of the disorder." The master mind of Sydenham, though perhaps inclined to the chemical pathology, saw the absolute necessity of casting off the trammels of the schools, and divesting itself of the fallacies they enjoined; instead of uninquiringly subscribing to received hypotheses and trying to become himself a renowned theorist, laudably descended to study minutely the workings of nature, and by a watchful observation of the phenomena which diseases manifested, made himself acquainted with many peculiarities and distinguishing characteristics that were hitherto unknown. Bacon found other branches of philosophy in a most unsatisfactory state; the dogmas of the ancients were implicitly embraced, and their chemical imaginings oft sweepingly adopted, without any original or independent spirit of thinking on the part of those who boastingly assumed to be the cultivators of science; his penetrating genius, however, at once saw that to strike into another and new path in the investigation of truth was quite indispensable, and that demonstrative facts could alone rightly supply the void to be made by the rejection of the equivocal tenets entertained by the schoolman and his contemporaries, which were custom, or the listlessness and mental inactivity of the age, had blindly acknowledged; and what this great reformer in the pursuit of knowledge did for philosophy in general, Sydenham achieved for medicine.

That there is a great and an important difference between symptomatic and idiopathic fever appears undeniable from certain considerations, although, as above stated, there are, and very talented, physicians, who have stoutly disallowed this difference. To entertain a correct theory is of paramount importance, as regards diseases, because upon these theories we found our practice. Pinel has given very sensible and cogent reasons, to show that these two kinds of fever, so called, are essentially dissimilar. Our nosology on many points is very illogical, and the terms employed are quite inexpressive of the meaning which ought to be conveyed; if the orders, febres, and phlegmasiæ, are not identical, symptomatic fever is an expression that might advantageously be expunged from the medical vocabulary altogether, and it might be well to substitute some other phrase, denoting the general disturbance to which a local affection may give rise. Words are but the vehicles of our thoughts, the passive means whereby our ideas can be communicated, and if there be ambiguity, and the want of succinct perspicuity in those means, the ideas themselves intended to be conveyed may be misconstrued or not fully comprehended. There is no consideration relative to the subject at issue demanding greater attention than that which endeavours to point out the specific difference which there is between pure fever and inflammation, because these differences demand an

opposite mode of treatment, and thus frequently the greatest dependencies are based on the decision. The definition given by Cullen of this first order, viz., *febres*, is as follows: "Pyrexia, after languor, lassitude, and other signs of debility, without any primary local cause." Boerhaave reduced the signs of fever to three grand heads, and contended that without such symptoms fever could not be present; these were, "shivering, frequent pulse, and heat." "A fever," says Fordyce, "is a disease which affects the whole system; it affects the head, the trunk of the body, the extremities; it affects the circulation, the absorption, and the nervous system; it affects the skin, muscular fibres, and membranes; it affects the body, likewise the mind." That fever is not inflammation, nor referrible to mere local complication, as some have erroneously imagined, appears pretty evident from the following considerations, viz.:—

1st.—Because we have the strongest reasons for believing that fever can be produced by miasmatic poisons, and the phlegmasiæ cannot.

2nd.—Cases of fever are seen where the traces of morbid action are not at all commensurate with the degree of intensity of the symptoms before death, and dissection not unfrequently proves that a fatal termination may ensue, where no indications are discernible of congestive or inflammatory action, or at least such morbid appearances as may be detected seem quite incapable of totally arresting the natural performance of the vital functions. Those who have had opportunities of repeatedly witnessing post-mortem examinations of fever, must be well aware of the correctness of the remarks put forth, nor are there almost any accounts recorded of important epidemic visitations, where it has not been noticed that inspections have thrown but little light on the fundamental causes of the disease, and the mode in which it directly induced death; and when it occurs in a sporadic form, the same remarks are equally applicable. Upon a careful examination of the bodies of many fever patients, during the time that I was officially engaged in the pathological theatre of the Edinburgh hospitals, I witnessed a number of instances of those who had not only died of the epidemic, but also of the ordinary typhus that prevails in Edinburgh and other large towns in Scotland, where no lesions could be discovered that seemed at all calculated to produce a mortal issue.

Case No. 11, to be subsequently given, forms one of many examples in the epidemic (especially in patients who suffered under the disease when at an advanced age) where no morbid traces at all worthy of note were detected.

3rd.—The unequivocal symptoms of idiopathic fever may be manifest, causing much constitutional disturbance, prior to the existence of any positive local affection, because the topical complication proceeds from, and is produced by, the conditions incident to the second stage, viz., that of high vascular excitement, which vascular excitement is in a great measure caused by the first stage, that of

congestion ; and the balance destroyed in the circulation from some hitherto unknown state in the system, during the first stage undoubtedly gives rise to the subsequent local affections, and the degree of intensity by which these affections are marked determines the mild or malignant character of the disease.

4th.—The cure of the topical complication does not cut short the disease.

5th.—The constitutional disturbance may be so great as to mask a local affection that will occasionally usher in a fatal result.

6th.—There is in fevers a natural tendency to progressively become worse, until they reach their acme, when some critical discharge from one or more of the emunctories of the body takes place, from which event gradual symptoms of amendment supervene, a circumstance seldom witnessed in pure inflammations, and certainly never in so marked a manner.

7th.—Fevers may be communicated by personal contact, or by means of the emanations of an infectious effluvia from the affected body.

8th.—The secretions and excretions in fever are more vitiated.

Lastly.—Fever seems to be constituted of certain changes taking place in the system, which changes or events, as they have been termed, decidedly differ in their predominant characters from those which are observed in simple inflammation.

The order of succession by which the conditions in question take place can with certainty be prognosticated in fever, as insisted upon above, viz., that the nervous and sensorial functions are the first in the train of diseased actions in idiopathic fever, while we know that the brain and spinal marrow are not necessarily the first to be affected in the phlegmasiæ. The foregoing facts observation has fully established, but we are not possessed of the means of deciding which of the vital organs, properly so called, shall become secondarily affected, nor the intensity of such affection ; respecting such in the present state of our knowledge we cannot determine. We know that symptoms are only the results of certain causes, and that to produce those symptoms the causes must operate whether in a latent or apparent manner, and that those symptoms correspond to the power of the first cause. We are aware that a case of pneumonia may be ushered in, and go through its course, without the great nervous centres being primarily disordered, and if such become affected it is last in the series of changed actions. Supposing such case of simple pneumonia to assume what physicians term a typhoid condition in its advanced stage, it would still be very different to the complication sometimes witnessed where the idiopathic fever has preceded ; that is, that between typhoid pneumonia, and the pneumonia of typhus, there is a specific difference ; yet to give an accurate and precise description in what such difference consisted, would, as previously observed, be exceedingly difficult.

Whatever may be the prime origin of fever, it is pretty certain that the first induced condition has a peculiar tendency to favour the operation of inflammatory action, and when such condition is present, inflammation in one organ or another is readily excited. This susceptibility, as observed, is most probably in a great measure dependent upon the circulatory function having become vitiated, and thus the due balance of the circulation being in some degree lost. During the febrile invasion, in the very commencement of the attack, we find that the whole system is affected before the brain and spinal marrow have given any marked evidence of primary or predominating disorder; the patient experiences a peculiar listless depression; the voluntary muscular system participates in the disorder, and the excretions are equally affected; phenomena witnessed in the order *febres*, but not *phlegmasiæ*.

Thus from these considerations it must be allowed that fever and inflammation are two and distinct diseases, and physicians who disregard these facts, forgetting that fevers have to run their course; that they cannot be abruptly checked in their progress like the *phlegmasiæ*; that there is, especially in those forms variously termed *adynamic*, *asthenic*, and *congestive*, a greater liability to a state of depression in the natural powers of the body; and that these powers require more care in being husbanded when the state of excitement has passed; that attacks which are apparently similar may on account of certain peculiarities in the constitution of the epidemic demand a different treatment; with many other considerations equally important—those, it is reiterated, who forget these truths are often led into grave errors—errors whose commission is attended with a fatal issue. The localists and essentialists have both very industriously set forth their reasons, and probably both are too exclusive in their opinions: if, according to the former, we are to account for the phenomena of fever by assigning its seat to one organ, then it follows that a rigid system of antiphlogistic treatment directed towards the brain would be most consistent, according to the views of Clutterbuck and others, and that a similar plan with regard to the stomach ought to infallibly cure the species of fever appellationed by Broussais *gastro-enterite*. Experience, however, every day tends to confirm us in an opposite way of thinking. Were we on the other hand to alone advocate the essential theory, the fact that inflammatory action in a greater or less degree is so common in idiopathic fever, it would be exceedingly difficult to prove such complication as being always of an adventitious origin. Did space allow, a multitude of arguments might be adduced, which from a parity of reasoning seem to leave no doubt on the mind that idiopathic fever and simple inflammation are essentially dissimilar; yet it must be confessed that were we compelled to precisely define in what their non-identity consists, that is, determining accurately from the proximate cause, the present state of our knowledge would not afford a definite and unequivocal explanation to this question.

These facts are now briefly mentioned, because, if the inflammatory theory were correct, the liver, which was most frequently affected in the epidemic now treated of, ought to have been the organ towards which the major part of the treatment should have been directed, and when efficiently treated the fever should have decreased in a ratio corresponding to the restoration to health of that organ.

The study of all diseases is much facilitated by reducing their symptoms into distinct orders and generic groups, but when the causes producing such symptoms are vaguely and indefinitely understood, it is quite impossible that any nosological classification can be unerringly founded. Upon a strict examination of certain laws by which both animate and inanimate nature are ordered (when the operations are perfectly understood), we find that certain causes are always attended by certain results, and that certain results can only be produced by certain causes; for instance, we know that precise volumes of certain gases, when blended, produce water, and from the produced quantity of water the exact volumes of the employed gases can be abstracted; that a given degree of heat will produce a state of expansibility in a given body, precisely commensurate with the degree of intensity of such heat; and this experiment might be repeated *ad infinitum*, if the body subjected to such process in its physical properties remained in a perfectly unaltered condition. Hence, as we are ignorant of the exact causes of fever, so do their effects and phenomena appear a tissue of doubt and perplexity; and while the remote and proximate causes are invested with so much mystery, so will the systems and classifications be in a great measure founded upon mere arbitrary distinctions. The great and grand discovery, then, to be made with regard to febrile disease, is manifestly a more correct knowledge respecting those primary conditions which produce their correspondent effects, and not so much with regard to the effects themselves.

There is, in the general features of continued fever, a sameness of character, when viewed as a whole, which might in a cursory manner almost lead us to infer that all its modifications and types originated in and depended upon one common cause. All forms of the disease present grand characteristics, which seem manifestly to possess an identity of nature, and which might appear, from what has been said above, to argue powerfully in favour of the oneness of the cause by which they were produced; and the unity of origin of even all classes and species of fever has been contended for by many writers and some very able authors. But the common cause may be so essentially modified by unintelligible conditions, as to produce those variations in its character which are so frequently noticed; indeed so much so as might with propriety be termed positively different, for we see their effects are different, though still retaining a grand feature of sameness, on account of which nosologists have arranged them under one order. The opinion that all denominations of fever depend upon one cause, including even

the exanthemata, intermittents, and remittents, is contended for by Southwood Smith, and others; and Bateman upholds the doctrine of unity of the cause of fever, when he says,—“All the attention which I have been enabled to give during the last fifteen years, to the passing phenomena of fever, and more especially the observations which I have made while several hundred cases have been presented to my view within the compass of a few months, have tended more and more to impress me with the conviction of the identity of that disease under all its classifications.” This opinion of Smith, Bateman, and others, I shall endeavour by the adduction of facts in the sequel to disprove.

A minute and authentic record of symptoms during any real febrile visitation is most desirable, and it was this mode of studying disease which gave to Hippocrates a distinguishing superiority over his contemporaneous practitioners of the healing art; for instead of seeking to give some far-fetched hypothesis, he rather contented himself with a correct delineation of nature; the only method in medicine calculated to ensure valuable results. In the establishment of any new theory, nay, in that of an isolated fact in any branch of science, much labour in the examination of all such considerations as might militate against the commonly received opinions is absolutely requisite, and the accumulation of facts and irrefragable data are quite indispensable; holding such in view, and finding that the fever now treated of presented unusual features, definite and substantial truths seemed highly indicated, and careful and attentive observance of its phenomena, from personal inspection, could alone lead to correct conclusions. “In writing the history of diseases,” says Sydenham, “every philosophical hypothesis which hath prepossessed the writer in its favour ought to be totally laid aside, and then the manifest and natural phenomena of diseases, however minute, must be noted with the utmost accuracy; imitating in this the great exactness of painters, who, in their pictures, copy the smallest spots and models in the originals.”

From observations founded on many hundreds of cases, the following considerations appeared as the most predominant features of the disease, and such as distinguished it from other forms of continued fever hitherto recorded. These are arranged under the subjoined heads:—

I. The invasion was very often unusually sudden, when compared with the ordinary mode of accession of the common forms of continued fever as witnessed in this country.

II. The rose-coloured measles eruption of genuine typhus was invariably absent. Petechiæ were observed of a dark purplish livid hue, never elevated, but clearly circumscribed.

III. There was generally absence of the injected ferrety looking eye.

IV. The disease almost always resolved itself by a well-marked and copious diaphoresis, this taking place most generally upon the

seventh, but varying from the fourth to the ninth day from the invasion.

V. The head symptoms were comparatively slight, and less severe than are commonly observed in typhus; the brain and its membranes were not so often found the seat of lesion.

VI. A very great majority of the cases had pain and tenderness over the hypochondriac and epigastric regions, and sickness and vomiting were almost constant symptoms at the commencement of the disease.

VII. There were an unusual number of jaundiced or "yellow cases," and with these were often associated a dark coffee-grounds looking (and in some instances black) vomit.

VIII. There was almost universally a recurrence of the primary symptoms during the patient's convalescence, and such relapse sometimes took place to the third or even fourth time.

IX. The pulse might be extremely high, without causing any alarm as to the result of the case.

X. The tongue was generally covered (except at apex and edges) with a thick, pasty, dirtyish-yellow, white-looking coat, mostly moist, at least seldom so dry as we frequently observe it in genuine typhus.

XI. Pregnant women at all periods of gestation invariably aborted, or were prematurely delivered.

XII. The kidneys were often the seat of diseased action, and in some instances death appeared to be induced by the absorption of urea, which was discovered in the serum infiltrated into the ventricles of the brain, and this product was also found in the blood both during life and after death.

XIII. Muscular and arthritic pains were exceedingly common during convalescence.

XIV. A peculiar form of ophthalmitis not unfrequently supervened during convalescence. (See Sequelæ.)

XV. The mortality was very small.

Such appeared in my own humble opinion to be the most distinguishing diagnostic marks of the distemper, and which give to the disease, when viewed as a whole, a peculiarity of character similar to which no epidemic upon record has manifested a positive resemblance.

TABLE No. V.

This table forms an analytical detail of the chief particulars respecting 80 cases; 40 males, and 40 females.

Number whose ages are under 20	.	.	.	20	1 in 4
Number whose ages are above 20 and under 40	.	.	.	40	1 in 2
" " " 40 and under 60	.	.	.	18	1 in 4.44
" " " 60	.	.	.	2	1 in 40
Resided in Cowgate	.	.	.	17	1 in 4.7
" Canongate	.	.	.	14	1 in 5.7
" Grass-market	.	.	.	7	1 in 11.42

Resided in West-Port	7	1 in 11·42
„ different Wynds	21	1 in 3·8
Temperate and moderately so	64	{ 1 in 35 or 1 in 1 $\frac{1}{4}$
Intemperate	16	1 in 5
Married	40	1 in 2
Unmarried	40	1 in 2
Contagion assigned as cause	28	1 in 2·85
Wet assigned as cause	17	1 in 4·7
Cold assigned as cause	13	1 in 6·15
No cause assigned	22	1 in 3·63
Average of days from seizure to admission	*4·7	
„ „ „ crisis	6·2	
Number of deaths	4	1 in 20
Mean frequency of pulse at admission	98·1	
Number requiring bleeding at arm	7	1 in 11·42
„ „ local bleeding by leeches	22	1 in 3·63
„ of relapses	72	1 in 1·11
„ in full employ	26	1 in 3·17
„ in partial employ	34	1 in 2·35
„ out of employ	20	1 in 4
„ of yellow cases	7	1 in 11·42
Complications†		

The manner in which the distemper was ushered in, like all forms of continued fever, admitted of some variation, such being induced by certain idiosyncrasies and other circumstances calculated to influence its development. It would have been difficult to have selected a number of cases to which the foregoing heads were unitedly applicable; nay, it might perhaps have been no easy matter to find but a few instances, in which were discoverable every one of the diagnostic distinctions; for as we scarcely at any time, or it might truly be said never, observe two examples of any form of disease exactly similar as regards every particular, so do we not notice positive resemblances in a number of patients even in an epidemic distemper, although the disorder, as is allowed, proceed from some common cause, and each individual case originate in and depend upon the same cause. Whatever part in the interminable field of nature we may chance to scrutinize, variety to infinitude is everywhere manifest. Throughout the animal and vegetable kingdoms we could not find two examples, in these grand divisions of nature, where positive and precise similarity of structure existed; it is true that two animals or two plants might so nearly resemble each other as to render it a matter of great difficulty, and

* Of the 40 male cases, the average is 6 3-10th days; and of the females 3 1-10th days.

† Out of the 80 patients 5 had acute pleuritis; 1, acute pneumonia; 1, nephritis; 3, a dysenteric attack; 2, singultus in a severe degree for a week; 1 had delirium tremens; and 1 was during convalescence removed to the medical wards, and died of Bright's disease.

positively of impossibility, to decide in what they were not identical; yet were our senses sufficiently acute to enable us to detect those differences, we should at once be convinced of the truism; so it is with regard to those diseases which afflict the body. Diseases immediately proceed from the abnormal actions of certain organs which are necessary to health and life, and those actions are always in an exact ratio to the states producing them, and as those states in all cases vary thus are the phenomena of disease never exactly alike. The same external circumstances will not produce in a number of individuals the same effects; peculiarities of temperament, constitution, and habits of life, for instance, often, in a very marked manner, not only modify febrile affections, but other classes of disease; often we may notice during the time of an epidemic attack that two individuals may be placed in the same locality, where the extrinsic influences are of one character in nature and degree of intensity—the poison producing the disorder in the one giving rise to the same disease in the other, yet one of the two may go through the attack in a comparatively mild way, whilst the other, in despite of every precaution and care, will unavoidably perish.

The initiatory symptoms of the disorder, when regarded in a general point of view, evinced a great similarity; a sensation of coldness, rigors, headache, often frontal and sometimes merely supra-orbital; lassitude; pains over the lumbar region, and in the limbs, the affection in the latter parts being described by the patient as a dull numbness; nausea; vomiting; loss of appetite; a heavy listless expression of the eye, and in the countenance was portrayed an obvious delineation of corporeal suffering. The shivering was at various periods of intervention succeeded by flushings, heat of skin, much thirst, slight or sometimes copious perspirations; the latter symptom seldom in any great degree relieving the pains of which the patient had previously complained. Sometimes the diaphoresis was incomplete during the invading stage, being then but partial, and only becoming general throughout the surface at the crisis. These local sweats were mostly manifest in the forehead, neck, chest, and at the flexures of the extremities. In those persons in whom was noticed a dry skin from the commencement to the crisis, the critical perspiration was then often very copious. The urine was decreased in quantity, and high coloured; the vomiting would not unfrequently be persistent for three or four days subsequent to the accession; the bowels were generally more or less confined; the pulse was full, quick, and somewhat incompressible. The patient seemed anxious and restless, would toss about in bed, and give utterance to his suffering in piteous moans, as if labouring under great bodily affliction. Upon inquiry after their arrival at the hospital, they generally stated that they had slept badly since the time of seizure, and that they had passed watchful nights without getting any sound or refreshing sleep. Such is a brief outline of the manner in which

the disorder set in; the symptoms above noticed will, however, be more fully particularised, as they are in due order arrived at in the description of the distemper now submitted to the reader.

Dr. Cormack, in his work published on the subject, has noticed, and apparently with no ordinary degree of importance, a remarkable feature in the fever which was either overlooked or disregarded by most of the other physicians and writers, who witnessed the affection; viz., "a bronzing, leadening, and purpling of the countenance before and after seizure." "In ordinary cases," says the same author, "the countenance of the patient has a peculiar appearance, which we may designate bronzed, for the want of a better term. Though no words can accurately convey what is thus attempted to be described, the appearance itself is very characteristic, and has never failed to arrest and interest the medical visitors to the hospital to whom it has been pointed out." That such statement is exceedingly equivocal most of those who had sufficient opportunities of judging of the real nature of the epidemic must readily allow, and several with whom I conversed on this point, and whose opinions were entitled to the highest respect, dissented most essentially from the statements advanced by that author. Again, Dr. Cormack says, that in the autumn the facial bronzing was most common, and that by the time when he published his book (December 1843) it had in a great measure vanished. Those gentlemen who were daily in the habit of seeing patients in every stage of the disease, from the very onset of the attack to its termination, must admit that in its manifest appearance little or no variation was discernible; indeed, as previously asserted, the evenness of the distemper in its general characteristics, throughout its duration, formed one of the many peculiarities which it presented, nor did it alter in severity, or in any essential properties, from the beginning to the close,—a circumstance unusual in former, and great epidemics, as the old writers generally notice that the attacks which they have recorded seemed to expend their greatest fury at the first, and, as they proceeded, their degree of malignancy often became so much diminished as to change the general features of the distemper. In the generality of febrile attacks occurring in cities and large towns, where the poorest and most destitute set of individuals are the first to become affected, and who, on account of their poverty and deprivations, are mostly a pallid, relaxed, and unhealthy class of individuals, with whom pectoral complaints are exceedingly common, we may readily conceive that when a fever breaks out amid such persons, lividity and congestion in the features from pulmonic obstruction might be, and is, of very frequent occurrence; and it was this appearance, I apprehend, which Dr. Cormack regarded as a specific indication of the disease, and not, as it ought to have been considered, a mere adventitious condition, induced by the operation of obvious and acknowledged causes. Upon reference to the statistical tables it will be seen that a very great majority of

the patients admitted into the hospitals were from the most impure and unhealthy localities in the city, where the miserable creatures who people those densely populated and noisome parts are many of them half-starved and half-clad, and with whom the different forms of bronchitis, phthisis, etc., are but too common; it is reiterated that we may easily imagine how a febrile affection will be more or less complicated with pulmonic congestion; and thus may be accounted for the appearance in question. Dr. Cormack, wishing to substantiate his opinion respecting the symptom now spoken of, quotes from Blanc, who writes of the yellow-fever as follows:—"There is something very peculiar in the countenances of those who are seized with the disease, discernible from the beginning by those who are accustomed to see it. This consists in a yellow or dingy flushing of the features, particularly about the parotid glands, where the yellow colour of the skin is first perceived." Had such been of so frequent occurrence in the late epidemic, as we are led to infer, it appears somewhat strange that the physicians in Glasgow, Dundee, Paisley, and other places, some of whom gave accounts of the disorder, should have silently passed over this novel feature, and, so far as my own experience warrants an opinion, I have little hesitation in saying that the assertion is exceedingly doubtful.

The pathology will now be treated of, according to the numeration of its division as above.

I.—*The invasion was often unusually sudden, when compared with the ordinary mode of accession of the common forms of continued fever, as witnessed in this country.*

The manner in which typhus commences is often insidiously, and the patient not unfrequently tells us that for some weeks he has felt slightly indisposed; at least, he generally says, that for several days he has experienced a degree of languor and lassitude, some degree of headache, loss of appetite, with more or less disinclination for exertion. In the seven days' fever, however, the sudden manner in which the initiatory symptoms set in convinced the physicians at an early period of its peculiarity as to this particular. Often, patients upon being interrogated would state that after they had gone to bed in usual health and spirits, they were on the following morning seized suddenly with a fit of shivering, pains in the limbs, nausea, headache, etc., which obviously determined the exact time on which the disease began,—a circumstance seldom so very markedly noticed in typhus. Dr. Christison, in his article on Continued Fever, in Tweedie's "Library of Practical Medicine," when speaking of fevers generally, observes:—"The appetite is occasionally at first not affected; the strength is at all times so little reduced that a man has been in the incipient stage known to walk forty-five miles within so many hours." In the seven days' fever the symptoms hurried on with much greater

rapidity; indeed, so much so, that patients would often present themselves at the hospital on the second and sometimes on the first day; and we see upon reference to Table No. V. that the average number of days from seizure to admission was not more than 4·7 days; in Table No. VII. 4·5 days; and the average would most assuredly have been much less if the patients could have invariably been admitted at the time of their first application; but, as before stated, the unwonted pressure of applicants beseeching admission was so great, and every bed so rapidly filled, that innumerable individuals had to wait for some days before it was possible to receive them into the institutions, if they were not unable to get in altogether. Dr. Welsh, in his work on the fever, thus writes with regard to the pathognomonic considerations now discussed. "Frequently the persons continue at their employment for some days, with languor, lassitude, aversion to motion, and loss of appetite; there are transient slight chills and flushings, after which they are attacked with decided rigors, pain in the back, and other symptoms of fever; more generally, however, the attack is sudden, the patient feeling previously no unusual sensation; sometimes, when at work, or when getting out of bed, to which they had gone in perfect health on the previous evening, or in short, after an unusual operation, they find themselves attacked with severe rigors, headache, pain in the back, nausea, and sometimes vomiting or diarrhœa." This description accords well with the accounts given by patients of the mode in which their disorder was ushered in during the epidemic of 1843-4; and the suddenness of the attack in this distemper was perhaps more decided than in the fever recorded by Dr. Welsh. Well-marked rigors were seldom absent during the stage of invasion; and patients would say that they felt as if something cold were trickling down the back. The numbers that were affected with certain symptoms, as given in the tabular forms, well show the sameness of character which the disease maintained throughout its course.

TABLE VI.—*Giving particulars respecting 450 cases of fever that were in the hospitals in January 1844.*

Males	210	1 in	2·14
Females	240	1 in	1·87
Under 20 years	130	1 in	3·46
From 20 to 40 years	217	1 in	2·07
From 40 to 60 years	85	1 in	5·29
60 years and upwards	18	1 in	25
Married	214	1 in	2·1
Unmarried	236	1 in	1·9
Number labouring under epidemic	426	1 in	1·034
Yellow cases	28	1 in	16·07
Affected with headache and pains in head	350	1 in	1·28
or 1 in $1\frac{1}{4}$, or about 4 out of 5.			

Affected with pain in chest	148	1 in	3·04
Affected with pain in abdomen	75	1 in	6
Nausea or vomiting (with more or less of tenderness at epigastrium) or about 10 out of 16.	273	1 in	1·65
Muscular and arthritic pains, especially during convalescence or 5 cases out of 6.	375	1 in	1·2
Hypochondriac pain, or tenderness on left side	74	1 in	6·08
Hypochondriac pain, or tenderness on right side or 1 in $11\frac{1}{2}$.	39	1 in	11·53
Hypochondriac pain, or tenderness on both sides simultaneously or 1 in $11\frac{1}{4}$.	40	1 in	11·25
Diarrhœa or dysentery or 1 in $6\frac{1}{4}$.	72	1 in	6·25
General blood-letting	19	1 in	23·7
Cupped	6	1 in	75
Leeches applied to head or 1 in $6\frac{1}{2}$.	68	1 in	6·62
Leeches applied to chest or 1 in $19\frac{1}{2}$.	23	1 in	19·56
Leeches applied to abdomen	16	1 in	28·12
Epigastric pain or tenderness or 1 in $2\frac{3}{4}$.	160	1 in	2·81
Cough during attack, requiring more or less remedial measures	55	1 in	8·18
1 Relapse or 10 cases out of $19\frac{1}{2}$.	231	1 in	1·95
2 Relapses	14	1 in	32·14
3 Relapses	2	1 in	225
4 Relapses*	0		0
Total of relapses or about 5 out of 9 that relapsed before leaving the institutions.	247	1 in	1·82
Required wine or 1 in $3\frac{1}{2}$, or 2 cases out of 7.	123	1 in	3·65
Required spirits or one in 12.	26	1 in	12·
Ordinary Typhus† or 1 in $18\frac{1}{3}$.	24	1 in	18·75
Had the genuine rose-red measly eruptions or 1 in $19\frac{1}{2}$.	23	1 in	19·56
Relapsed in typhus	0		0

* As patients were generally dismissed as soon as possible from the hospital, in order to afford room to other applicants, it not unfrequently happened that they relapsed after going to their own homes, which of course renders the proportion who had a repetition of the disease greater still.

† Out of the twenty-four cases of genuine typhus, it is seen that no less than twenty-three of that number had the true measly rash.

In Table No. VI., out of 450 patients, 350, being 1 in 1·28, or 1 in $1\frac{1}{4}$, or about 4 out of every 5, had headache or pains in the head; of the same number, nausea or vomiting occurred in 273 instances, being 1 in 1·65, or about 10 out of every 16 cases. In Table No. VII., out of 40 cases, 31, being more than 3-4ths, had, during the invasion, aching and pains in the head, and no less than 38, being 9-10ths, had well marked rigors. In Table VIII. the invading symptoms were as follows:—65 out of 80 cases, or 1 in 1·23, had rigors; 56, or 1 in 1·42, nausea or vomiting; 52, or 1 in 53, arthritic or muscular pains. The celerity of its commencement was well illustrated in the persons of certain parties who resided in the hospitals, and there contracted the disease. Dr. Cameron, who, in the autumn of 1843, was physicians' resident-assistant in the large fever hospital, Surgeons' Square, on the morning of the day on which he began to be ill ate a hearty breakfast, then experiencing no premonitory symptoms; and in an hour or two subsequently was seized with sudden pains in the right arm and shoulder, especially in the biceps muscle,* and from that moment he became rapidly worse; so much so that in the afternoon he was obliged to go to bed. My friend, Mr. (now Sir) John Watt Reid, who was Dr. Cameron's successor, was first warned of his attack by a quick lancinating pain in the right shoulder, whilst seated over the fire in a friend's house, from which moment the disease very speedily progressed. Also, my friend, the late Dr. Wentworth Heude, who was in the Institution, began equally suddenly. In the morning, when at breakfast, I observed nothing at all unusual either in his appearance or spirits; in the evening of the same day he was in bed with his head shaved. It may here be remarked, that the above mentioned facts (of three persons quickly taking the distemper), powerfully favour the opinion that the fever was of a highly contagious nature. Each of these gentlemen, who were successively attacked, had, previous to their taking the affection, resided in different and distant parts in the new town, where the epidemic prevailed in a very limited degree, and scarcely at all in the squares and respectable streets; yet we see, as soon as they became exposed to infectious influence, they each readily took the distemper. Other two gentlemen, who, after the former, discharged the duties of that establishment, also contracted the disorder, and the whole of the five spoken of caught the complaint within as many months. Their becoming affected could hardly be attributed to malaria, because this hospital had been newly fitted up for the reception of fever patients, with a view to keep them distinct from the Royal Infirmary and the surgical department; a general reparation had for some time been carried on in the interior; the newest and most approved contrivance for an efficient ventilation constructed, by which an ample

* Some practitioners who witnessed much of the disease asserted that it was no uncommon thing for a sudden piercing pain to be experienced during invasion, in the deltoid muscle.

perflation of air could readily be directed through each apartment, and every precaution as to cleanliness, and similar considerations, had been strictly attended to before any case was admitted. Besides, if malaria had been the cause, it is fair to presume that some of the workpeople, who had been long employed in the alterations, would have contracted this particular fever, which was not the case. From these previous, and many other facts that might be advanced, the only legitimate inference to be arrived at is, that the distemper was of a highly contagious nature. I distinctly remember many instances during the autumn, especially amongst the Irish reapers, who were employed in the Lothians, of individuals who had gone to the harvest field in the morning to prosecute their occupation, and in wonted health; in the evening they were conveyed to the hospitals, having had the invading symptoms come on so suddenly as to render them incapable of further exertion. Dr. Cormack says, he did not find that his patients described their attack as following some "unusual operation," as insisted upon by Welsh, in the epidemic of which the latter relates. It has been said, that whatever lowers the tone of vital action predisposes the body to disease, and renders it much more prone to the contraction of an infectious disorder; and it is quite reasonable to suppose that the system might absorb a certain quantity of poisonous effluvia, which during a state of quietude of the body might latently lay innocuous; yet if some exhausting or debilitating cause come into operation, and thus the repellent power of high and vital action be lowered, the absorbed noxious agent being now enabled to overcome the salutary repulsive efforts on the part of nature, such might spring into progressive existence, and thus a disease be lighted up in the system that might, according to its particular nature, uninterruptedly proceed through its course.

It is a commonly received opinion that there is the most risk in coming within the range of an infectious effluvia, when a person feels languid and depressed, and medical practitioners, when practicable, endeavour, wisely, to avoid exposing themselves to such, if labouring under those states. My friend, Dr. Fleming, left the hospital on leave of absence, and went to the country in perfect health. On the second day after his departure he had a very long walk, after which he was much fatigued. The next morning the unequivocal symptoms of the epidemic fever were manifest, and from that time he quickly became worse, and went through the disorder in its ordinary form. Now in the town where he was taken ill there was not, nor had been, any instance of the seven days' fever; for months previously, however, he had been in daily communication with patients affected with the distemper, and did not commence in the disease, but as soon as ever the system became debilitated the fever was developed. Here, then, is an example, and a very argumentative fact it supplies, favouring the supposition that an unusual exertion formed the exciting cause to

the disease. Almost all military medical writers notice that long marches are the invariable preludes to diseases, especially those of a febrile character; and troops, when in moderate exercise, in garrison, will be very healthy and tolerably free from fevers; but if they should be exposed to privations, and great physical exertions, those affections will often break out, and sometimes decimate their ranks. Respecting the unwonted suddenness of the fever now described, we can only attribute the cause of such to certain unintelligible properties in the nature of the poisons giving rise to it; it may be to the relative proportions in which the elements entering into the causation of the epidemic were blended; to the predominance of some powerful agent or the like, which is more probable than that such was owing to personal peculiarities, because the characteristic was exceedingly common, being the rule and not the exception. Had it occurred merely in a few isolated cases, we should have rather felt inclined to attribute it to certain states within the body, which were highly calculated to further its development, instead of assigning it to the common cause, to specific influences in the prime causation. A physician, who saw much of the distemper, when adverting to the point now discussed, observes:—"From what I have seen and heard of the manner of the invasion of typhus fever in various epidemics, I regard the sudden and violent invasion of the present form as characteristically different from the way in which that disease sets in."

II.—*The rose-coloured measly eruption of genuine typhus was invariably absent. Petechiæ were observed of a dark, purplish, livid hue, never elevated, but clearly circumscribed.*

Petechiæ have been alluded to, and sometimes importantly, by most writers upon fever, and perhaps the older authors laid more stress upon this pathognomonic appearance than more recent authorities, because they were generally the accompaniments of very grave types of the disease; hence it is fair to suppose that their description would hold a pretty prominent part in the treatises upon epidemic and pestilential visitations. Pure exanthematic eruptions have from the remotest times of medicine been considered as the manifest results on the part of nature, which it effects in throwing off from the body the deleterious matters which it may have imbibed; and some physicians have imagined, and plausibly, that the measly efflorescence in typhus is a diagnostic mark constituting a chain of connection between continued fever and the exanthemata. It is quite an arbitrary distinction that divides the latter from the former, and if regarded in an abstract point of view, there is less positive difference in the real nature of the two orders of disease than nosologists would seem to infer. In the fevers occurring in some of the large towns in Scotland and Ireland, and in London, this (the measly) form of eruption is far more common than in the English

provincial districts; generally speaking, with the exception of the metropolis and some of the cities and large towns in this division of the empire, eruptions in true cases of continued fever are by no means common, certainly very much less so than in the places above mentioned. When eruptions occur at a late period in typhus, such circumstances are accounted as by no means favourable conditions; and if they should not become manifest sooner than the tenth or twelfth day, such instances very often pass on to a mortal termination. Petechiæ are most frequently noticed in those fevers which assume much debility and prostration; and vibices, hæmorrhagic discharges, etc., are generally the concomitants of fevers the mortalities of which run high. Petechial spots, and the measly eruption of genuine typhus, are not only dissimilar in their ostensible characters, but appear to be produced by opposite morbid processes; and the following inferences may seem legitimate deductions as to their production. If the hand is drawn over the elliptical rose-coloured eruption of typhus, an irregular surface is felt as if from ill-defined papillar eminences; these upon slight pressure being made by the finger momentarily become pale and indistinct; upon the stress being removed they quickly recover their wonted pinkish-red appearance, and in the course of time the cuticle by which they are covered is desquamated. The livid hæmorrhagic petechiæ are not elevated, but clearly circumscribed, cannot be obliterated by pressure, and the superjacent cuticle does not peel off. The former seems to be produced by anormal high vascular action, and are immediately caused by the rupture of the arterial capillaries, and not by the venous extremities, because we see that pressure readily empties them of their contents, and that when such pressure is suspended they quickly become refilled with bright arterial blood; therefore their circulation is not wholly arrested, but merely retarded in its course; and their elevation is most probably owing to the following conditions:—

1st.—To the increased calibre of the vascular extremities which transmit coloured particles.

2ndly.—To those minute ramifications which in a state of health give passage to a colourless fluid, becoming permeable to the red blood globules; this change being partly effected by an increase of power in the *vis-a-tergo*.

3rdly.—To the exudation, in a greater or less degree, of arterial fluid into the surrounding cellular tissue, which from the greater impetus of the blood might not be allowed to coagulate; and the desquamation of the cuticle is undoubtedly owing to local pressure, which may either destroy its integrity, or so disorganise it as to render its exoriation an unavoidable consequence.

The latter kind may have their origin from a different operation of causes; chiefly by the want of tonic power in the venous extremities, which becoming congested from retardation in the circulation of these parts, their calibres become enlarged, the power of propulsion destroyed,

and rupture into the surrounding filamentous textures the result, when the effused blood there coagulates, and remains until the absorbents carry it off, because these spots in their colour and external character differ from the former, because pressure cannot disperse their contents, evidently showing that circulation is suspended, because they are clearly defined, and because they are mostly associated with asthenia. The cuticle is not thrown off, on account of its not having been subjected to subjacent pressure. We know that the function of circulation is immediately under the influence of the function of the nervous system, that the former is quite dependent upon the latter; and this holds good from the radical commencement of the arterial tree to its ultimate extremities, and between the minutest febrillæ of nervous matter and the adjacent capillaries there is a positive relation; hence, if the great nervous centres become affected, which is the case eminently in fever, such affection is transmitted to the most distant parts. Thus, in the adynamic, or, in the language of those "physicians who still linger round the ruins of the Brunonian school," the asthenic form, it follows that the febrillæ of nerves which go to supply with nervous energy, the vascular extremities becoming affected, the vessels then being deprived of their natural nervous stimulus, their contractile power is deteriorated, and inordinate distension, rupture, and effusion into the surrounding cellular tissue, in a consecutive order, succeed; thus, from these premises it is plausible to conclude, that in fevers where much prostration and want of power exist, in such kinds of attack, petechiæ, vibices, and hæmorrhages, are very probable sequences.

According to Halluer, the venous circulation may become so slow that coagulation may actually occur in the living body, without any extravasation; we may conceive, then, how readily the venous blood will coagulate when any conditions place it apart from the circulatory power. The conclusions arrived at by Stephens, Clanny, and others, were that the blood during fever became deprived of much of its fibrine, and we well know that in many malignant cases of typhus, the blood found in the cavities of the heart and in the large vessels is a dark thin fluid gore, instead of being as normally of a caky formative consistence; hence the blood being robbed of its lentor becomes far more liable to be transuded by the capillaries, and thus may we in some measure account for those passive hæmorrhages which occasionally take place on the mucous surface of the alimentary canal, in the hepatic capillaries of the vena portæ, and into the various cavities of the body as well as in the cutaneous tissue. Huxham, when speaking of petechiæ, makes the following correct observations:—"When black, livid, dun, or greenish spots appear, no one doubts their malignity; the more florid, however, the spots are, the less is it to be feared; it is a good sign when the black or violet petechiæ become of a brighter colour. The large black or livid spots are almost always attended with profuse hæmorrhages."

In some epidemics upon record the petechiæ were not confined to the skin alone, but also distinctly discernible upon the serous membranes covering the viscera, and those who have had opportunities of examining the bodies of patients who have died of variola, will undoubtedly have seen instances where the eruption was manifest upon some of the internal surfaces.*

The eruption noticed in genuine typhus has, and deservedly, been accounted as one of the most infallible diagnostics of that disease, although it may, as we are well aware, be absent, and the true affection be present; that is, in those localities wherein those epidemics in which the eruptive form of the disease prevails. The physicians in the Edinburgh hospitals, at an early period in the summer of 1843, paid particular attention to the kind of spots that were noticed on the bodies of the patients labouring under the epidemic, and they sought, if possible, to find a case in which were united the seven days' fever with the true typhoid rash, but in no individual could such be discovered. From the careful examination of at least twelve hundred cases, made by myself, in no single instance could the measly eruption be discovered in union with the short relapsing fever, nor do I believe that such were ever witnessed conjointly at all; if such had been noticed in a repetition of cases, and demonstrable conviction given that they might occur unitedly, it might then have been plausible to presume that the disorder now described was a mere modification of typhus, and not a new disease; because, as above insisted, the measly rash of typhus is the most indubitable of all other characteristics of that disorder; in fact, as much so as any of the other exanthematic eruptions are indicative of their respective affections.

The petechial spots in the seven days' fever bore a very near resemblance to flea-bites, and for such they were for some time taken. They varied from the size of a pin's head to the section of a small pea; a single night would suffice for their production, and they maintained the purplish livid hue for two or three days, after which they gradually assumed a bright rose-red colour, which by degrees changed into a light fawn yellow, and then imperceptibly became indistinct. Many contending that they were always produced by fleas, in a number of instances I made a careful examination, by means of a common magnifying lens, and found that no central puncta could be discovered, which was not the case in the spots left by the insects. Dr. Henderson also made some experiments, by which he came to the same conclusion, and from the accounts of the patients as well, no doubt whatever was left as to the nature of their origin; viz., that they were the spontaneous results of the disease. The cuticle on being examined by the lens during

* Cases of small-pox have come under my own notice where the mucous membrane of the pillars of the fauces, on the pharynx, along the œsophagus, as well as on the surfaces of other of the internal organs, have been studded with variolous eruptions.

the time that they were dark and hæmorrhagic-looking, appeared tense and shining; when the fawn-yellow hue supervened it then became slightly wrinkled, but never desquamated. Dr. Christison informed me, that in 1817-20 the petechiæ, noticed in that epidemic, were precisely similar to those now spoken of. Dr. Arnott, of Dundee, in a paper published on the seven days' fever, says:—"I have only seen one case in which there was a combination of the yellow fever* with the eruption so resembling measles, as frequently observed in typhus." In an isolated case, like that adduced by the writer, there may have been some source of fallacy, and it is very probable that the eruption in question was not the genuine typhoid rash, but urticaria, to which it bears a close resemblance. Facts deduced from meagre data necessarily endanger the correctness of an opinion, especially in medical science, where so much labour, research, and experiment are absolutely demanded to fully and unequivocally establish a single fact, and where so much that is doubtful and positively false is mixed up with what we satisfactorily know to be true and acknowledged. Dr. Alison, in an article on the epidemic, states:—"None of these cases running the short course have shown the true febrile eruption resembling measles, although many have shown petechiæ, or purple spots, originating in flea-bites, and extending apparently by little ecchymoses." As insisted upon above, Dr. Alison seems to have erred in supposing that these spots were wholly attributable to flea-bites; there can be little doubt that the mark left by the insects would be attended with a certain degree of extravasation of blood, and, in some instances, so nearly simulate those spontaneously produced by the disease, as to render it difficult to discriminate between the two; which, however, could only be done by means of a magnifying power. From what has been said respecting the impoverished state of the blood in fever, its proneness to extravasation, and, in asthenic cases, the want of tonic power which there is in the capillary extremities, it may readily be conceived how flea-bites would operate as exciting causes to those little cutaneous effusions; but what has been endeavoured to prove is, that they were mostly the results of the disease, independent of such exciting causes. The neck, chest, superior and inferior extremities, were most frequently affected, and the spots were chiefly observed in the persons of weak and relaxed females, whose muscular system was flabby and resistless, and where a pallid and emaciated appearance was manifest. Dr. Craigie noticed the condition, now considered, as follows:—"No eruption of spots is observed similar to that observed in genuine typhus. But in a certain proportion of cases an eruption of dark red spots, like those of purpura, was observed on the persons of patients. In some instances those bore so close a resemblance to flea-bites that they were entirely dis-

* From there being in the Dundee Hospital a very great proportion of jaundiced cases amongst the epidemic patients, the physicians termed it the yellow fever, in contradistinction from the ordinary typhus.

regarded, or ascribed to this cause. In others, however, they appeared connected with the state of the individual's health. At length it was found impossible to doubt from the frequent occurrence of these purple spots that they were connected with the disease. They were seen in the first attack, and as that declined those spots disappeared. They did not, as far as I am aware, appear in the second stage or relapse. In some instances the rose-red spots of typhus were observed, but these were regarded as instances of a fever quite different." From the cases which came under my own inspection, the petechiæ now spoken of were by far the most commonly noticed during the first attack, yet they would occasionally be manifest in the relapse. The subjoined case illustrates this fact.

CASE I. — *A usual form of the fever. — Present attack a relapse. — Crisis by diaphoresis on seventh day. — Hypochondriac and epigastric tenderness. — Dark, livid, circumscribed petechiæ.*

Janet Piffers, æt. forty-one, married, has had eight children; hair and eyes dark; reduced in flesh; countenance pallid, and looks anxious and depressed.

Admitted November 24th.—States that her present attack is the second; that she was convalescent from the former attack, and suddenly relapsed, three days ago (November 21st). Her indisposition was ushered in by shivering, dull and continued pains over lumbar and frontal regions, a sensation of stiffness in the limbs, nausea, anorexia, and great prostration of strength. This, the cold stage, continued for four hours, and was succeeded by flushings, heat of skin, much thirst, and increased headache; also slight sweats, which in some measure relieved the muscular and arthritic pains.

On admission, the skin is hot and dry; complains of aching pains in the superior and inferior extremities, in the small of the back, and forehead. Has great tenderness on slight pressure over the hypochondriac and epigastric regions; eyes not at all suffused, the adnata rather looks blanched. Upon a deep inspiration the thorax normally expands. No cough; breathing easy. Says she feels sick, and has vomited at intervals ever since the commencement of the attack. No pain upon pressure on the middle and inferior regions of the abdomen. Tongue covered with a thick, dirty, whitish-brown looking coat; is clean at apex and edges, these parts being somewhat redder than natural; towards the centre of the organ are two or three deep, longitudinal, and irregular fissures. Posterior part of dorsum more loaded, and of a deeper colour than the anterior, is generally moist. Sleeps indifferently. Bowels confined. Pulse 98, of tolerable strength.

Habeat statim Pulv. Jalap. Co. drachmam unam. Mist. Diaphor. ʒviij.
Cujus capiat unciam, q. q. horâ.* Bibat potum, vegetab. ad lib.†

25th.—Has vomited during the night, the matter ejected being a dark bilious fluid. Nausea continues. A good deal of headache, which is chiefly referred to the os frontis. Bowels opened three times with powder.

Mist. Cont. Sinapis Epigastrio, app. Abradatur capalitium.

26th.—Feels much the same as yesterday. Some nausea continues. Bowels open. Tongue moist, but foul. Pulse 108, rather compressible. Headache relieved by shaving.

Sp. Communis, ʒij. in die. Enema Terebinth. injiciatur. Horâ somni habeat haust. cum Sol. Mur. Morph. gtt. xxv. et Mist. Camph. ʒiss.

27th.—Symptoms much the same as yesterday, with the exception of the sickness, which has in some degree abated. To-day a petechial eruption is observed upon the skin, chiefly upon the chest and extremities. These spots vary from the size of a pin's head to that of a small pea; they are of a dark, livid, purplish-red colour, not in the least elevated, and clearly circumscribed, greatly resembling in colour the purpura hæmorrhagica. When examined with a common lens, the epidermis covering them is a little shining, and perfectly whole, no puncta or flea-bite being discoverable. They have appeared during the last night, or rather since the visit at yesterday noon. Tongue foul, and moist; bowels opened; slept better; pulse 112, rather weak.

Sp. Communis. Mist. et haust. rep.

28th.—Sweat last night. Tongue cleaner, and moist. Says she feels improved; had two small watery stools. Eruptions of a brighter red; the spots are not more numerous than yesterday. Pulse 92, still small and weak.

* The following are the formulæ of the diaphoretic mixtures prescribed in ordinary fever cases in the Edinburgh hospitals:—

Mist. Diaphor. Antim.

Rec. Aquæ Font. oz. xss.; Sacch. Purif. dr. iss.; Vini Ant. Tart. dr. iij;
Tr. Opii, gtt. xxv. Misce. Dosis oz. j.

Mist. Diaphor. Salin.

Rec. Aquæ Acet. Ammon. oz. ij.; Aquæ Font. oz. iv.; Syrup. Simp. dr. vi.; Misce; dosis oz. j.

† The annexed are the forms of the drink generally ordered in fever cases, in the above hospitals:—

Potus Acidus Mineralis.

Rec. Aquæ Font. oz. xxxii.; Acidi. Sulph. Dil. gtt. lxxx.; Sirup. Simp. oz. j. Misce; sit potus acidus mineralis.

Potus Acidus Vegetabilis.

Rec. Aquæ Font. oz. xxx.; Potassæ Super. Potassæ Super Tart. Scrup. iv.; Syrup. Simp. oz. ij. Misce; sit pot. acid. vegetab.

The various other medicines prescribed in these cases are according to the prescriptions and formulæ of the Edinburgh Pharmacopœia.

Sp. Communis, etc. cont.

30th.—Gradually improves, and gains strength. Complains of no pains, nor has had any return of the vomiting since the crisis. Eruption fading rapidly; the spots are now of a yellowish hue; the cuticle over them is bright and shining, and slightly shrivelled. Tongue nearly clean, and moist. Bowels open. Appetite more natural. Pulse 88, of better strength.

Ordered common diet.* Mist, omit. May have half a pint of porter in the day, instead of the spirits.

Dec. 2nd.—Continues to improve.

4th.—Continues to improve, and eruption gone.

7th.—Progresses favourably.

10th.—Convalescent.

REMARKS.—In the case of Piffers is afforded a good example of the manner in which the distemper usually sets in. We see that she had shivering, pains over the lumbar region, thirst, anorexia, slight sweats, etc., during the first two or three days; afterwards the skin became hot and dry, pain at the hypochondria and epigastrium; that the tongue was covered with the fur so peculiar to this fever; that there was a good deal of vomiting of a dark bilious fluid, and that she had a crisis by diaphoresis on the seventh day. The true characteristic petechiæ were present, and her convalescence was marked by a very speedy recovery. This woman was under the care of the late Professor Graham, and I well remember that to her case particular attention was paid, in order to ascertain satisfactorily the positive nature of the spots discovered upon her person, and from the woman's own statement, as well as from a strict experimental investigation, no doubt whatever remained as to the cause of their production.

Dr. Henderson, whose great experience in typhus fever rendered his opinion highly valuable, placed the greatest reliance upon the measly eruption as a diagnostic mark of that disease, and in a paper published by him it is stated, that out of 130 cases of typhus that had come under his notice, in 108 were found the genuine rosy eruption, and that six out of the remaining twenty-two were not admitted into the hospital until after the twelfth day of the disease. Dr. Cowan, of Glasgow, from an average of two

* The fever patients, on admission, were put on the subjoined diet:—

Low Diet.

Breakfast—Bread, 3 oz.—Tea, half a pint.

Dinner—Panado: Bread, 3 oz.; Milk, 2 oz.; Sugar $\frac{1}{4}$ oz.

Supper—Bread, 3 oz.; Tea, $\frac{1}{2}$ pint.

As under formed the common diet:—

Common Diet.

Breakfast—Bread, 6 oz.; Coffee, $\frac{1}{2}$ pint.

Dinner—Potatoes, 16 oz.; Broth, 1 pint.

Supper—Bread, 6 oz.; Tea, $\frac{1}{2}$ pint.

thousand cases, found that between seventy and eighty per cent. had the eruption; that is, in the fever common to Glasgow. Dr. Cormack comes, and rather sweepingly, to the conclusion that the elliptical spots were observed in epidemic cases, although he is enabled to instance but one individual in whom the appearance was manifest, viz., Mary Wallace, one of the day nurses in the Fever Hospital. This woman I saw and examined during her epidemic attack, but could not certainly have affirmed that the eruption was of the true typhoid character; that it did resemble the measly rash must be allowed, and that it equally looked like urticaria was also evident. A short time, however, indisputably settled the matter, as this woman, in the course of a very few weeks after her convalescence from the epidemic, had a second attack, which was genuine and unequivocal typhus, in which the true rash was noticed; therefore, the following quotation from the work already referred to is exceedingly doubtful, if not absolutely incorrect, viz., "That there is such a thing as persons being occasionally affected with the measly eruption in addition to the usual symptoms of the present fever (meaning the seven days' fever)."

III.—*There was generally absence of the injected ferrety-looking eye.*

An injected condition of the eye in fever is an indication upon which the greatest reliance may be placed, that more or less of cerebral affection exists, especially during the state of excitement; but in a more advanced stage, when we have reason to suppose that serous effusion is going on in the ventricular cavities of the brain, the eye, instead of being red and ramified, is more frequently blanched and pale. Armstrong, when describing the symptoms attendant upon inflammatory action within the head, happily conveys the peculiar appearance of the eye, when he says that "there is a physical brightness with an intellectual dulness." The ferocious expression given to the features, when those organs are in a state of great vascularity, has always been regarded as a sure sign of head complication, that is, if the symptom be persistent; and when we consider the origins of the vessels supplying these organs, and that by the researches of pathological anatomists, by comparing the symptoms before with the morbid appearances after death, in such cases, there is mostly found great injection of all the vessels proper to the encephalic mass, with more or less of febrile effusion, the condition in question becomes a highly important diagnostic distinction. In the relapsing fever, the absence of vascularity in the eye, especially when compared with the true typhus cases, particularly forced itself upon my attention; and after having witnessed many instances of the epidemic, from this pathognomic characteristic alone, it was almost possible to rightly discriminate between the two; and the absence of delirium and severe head complication which were noticed in the epidemic, tend to confirm the preceding remarks.

IV.—*The disease almost always resolved itself by a well-marked and copious diaphoresis; this taking place most generally upon the seventh, but varying from the fourth to the ninth day from the invasion.*

The ancients in their times noticed that fevers, after having reached their acmè, possess a natural tendency to pour forth some critical discharge, by which the body seems to be relieved from the deleterious effects of its contracted noxious agents—a doctrine that is also entertained by the older authors and modern writers; and as this disposition on the part of the system does not become manifest until the disease has arrived at an advanced period in its duration, and after the general disturbance has reached its maximum, when any important change in, or powerful impression made upon, the economy of the body is sure to be attended with marked results; hence it is that physicians have ever regarded the crisis of fever as a weighty consideration amid the phenomena presented. This crisis, or *turn*, as it is vulgarly called, is by no means uniform, either as to the period of its supervention or the manner in which it is characterised; in some epidemics it may be very apparent and of constant occurrence; in others the change to amendment may be exceedingly slow, and by almost imperceptible degrees. Again, in some fevers slight hæmorrhages from one or other of the internal cavities, or a moderate attack of diarrhœa, may mark the period at which the change for amelioration takes place, whilst in others a moderate or copious diaphoresis will form the indication of improvement. Hæmorrhagic discharges, increased action in the bowels, or a general perspiration, are, however, the chief modes by which the change in the system is rendered manifest; and if the natural powers of the body be not too much depressed and exhausted with the evacuation by those means produced, the febrile state then usually undergoes a declension in the degree of its intensity—if an apyrexial condition be not immediately (which is sometimes the case) produced, as in an intermittent—and the disease vanishes with greater or less celerity. Sometimes an immoderate diarrhœa, or a very powerful sweat may come on, or a copious hæmorrhage from one or other of the outlets of the body supervene, which, instead of ushering in the commencement of convalescence, not unfrequently prove to be the unwelcome harbingers of a speedy dissolution. In cases of pure typhus, if the pulse should be very high, a copious diaphoresis may generally be looked upon as an occurrence denoting much danger; again, if the sweat be partial, that danger is more to be apprehended, as a mortal issue is then often at hand. In ordinary typhus the skin becomes moist often by degrees, and the abatement of urgent symptoms gradual, being the effect of a few or sometimes several days; or if the sweat should be profuse, as remarked, the patient not uncommonly sinks. In the seven days' fever, a patient might be labouring under hot skin, a very quick

pulse, being sometimes so high as a hundred and fifty or sixty, much headache, pains over the lumbar region, a watchful restlessness, diminished excretions, with an anxious febrile expression of the countenance, and the sweat would quickly become manifest, lasting from two to five or six hours; on the supervention of which a marked difference was suddenly perceptible; the body would then be bathed in perspiration, the headache and general pains subside, the tongue become more moist, the pulse rapidly fall, the thirst be less urgent; in fine, the general febrile state abruptly and efficiently checked; and after a few refreshing hours of sleep, which were now mostly obtained, the individual would express himself as totally free from any distressing symptoms, and being in all respects comfortable, with the exception, perhaps, of a degree of debility, which, of course, could scarcely fail to be experienced; but the fever was now veritably arrested as far as it was possible for it to be. The following cases may perhaps here, with some aptness, be cited:—

CASE II.—*Crisis by a well-marked and copious diaphoresis, on the seventh day; relapses on the thirteenth day of the disease; resolution again by sweating.*

Christiana Drummond, æt. seventeen, single, a servant: admitted August 10th, 1843.

Complexion light; volume of flesh good. States—Has generally enjoyed good health; had typhus fever seven years ago; with this exception never had any important illness. On the 5th August felt unwell; had a fit of shivering, which was succeeded by alternate flushings and general sense of chilliness, with pain in the head, and aching in the superior and inferior extremities and over lumbar region.

On admission (fifth day of fever) complains of headache; pains in the back and limbs; some tenderness over hypochondria and epigastrium on moderate pressure; has some nausea, but no vomiting; appetite not greatly impaired; much thirst; skin feels hot and burning; respiration performed without any uneasiness, and thorax fully expands. No cough; no expectoration; urine scanty and high coloured; tongue covered with a dirtyish-yellow coat, but moist and clean at apex and edges; pulse 126, full, and of good strength.

Habeat Mist. Diaphoreticæ, ʒj. 4ta q. q. horâ.

August 12th.—Feels much easier to-day; had a copious sweat early this morning; complains of no pain whatever, but says she feels weak; skin cool; countenance not so feverish; tongue moist; pulse 80.

Mist. repetatur.

August 13th.—No pain; continues to improve; skin moist; tongue cleaner; pulse nearly natural, and bowels open.

14th.—Continues to improve.

15th.—To-day feels much the same as yesterday.

18th.—Does not feel so well as she did yesterday; complains of some muscular and articular pains; bowels not moved since last visit; has slight headache, and face seems a little flushed; pulse 112; tongue rather dry and glossy in the centre.

Pulv. Jalap Co. statim sumendis, gr. j. Mist. Diaphoret. Cont.

19th.—Finds herself easier, but skin is still dry; tongue rather bright and shining; bowels opened; pulse 112.

Mist. Diaph. Cont.

21st.—Is better to-day; perspired this morning; skin moist and tolerably cool; bowels open; tongue moist and cleaner; pulse 84, of good strength.

22nd.—Continues to improve.

24th.—Is much better, and allowed to get up.

Ordered common diet.

27th.—Improves.

31st.—Convalescent.

REMARKS.—In this woman's case we see that her disorder was ushered in with alternate flushings and rigors, headache, pains in the extremities, etc. On the morning of the seventh day a copious sweat at once arrested the progress of the fever; the pulse fell to near its natural standard, the tongue became moist and the skin cool; and on the thirteenth day she had a relapse, which was characterised by a close repetition of the primary symptoms; at the expiration of three more days, this, the second attack, was in a similar manner, and as effectually, resolved; viz., by diaphoresis.

CASE III.—*Crisis by diaphoresis on the seventh day; relapses on the fourteenth day; after other two days the disease is again resolved by sweating.*

Ellen Main, æt. forty, married, had no family; admitted August 14th, 1843; hair and eyes dark; countenance pretty natural, not at all emaciated.

On being interrogated, states: is a native of Paisley; for the last few years has been residing in Glasgow, from whence she came to Edinburgh three days ago. The locality where she lived in Glasgow was one of the most crowded and ill-ventilated parts of the city, where the epidemic was exceedingly prevalent. Her husband has been for many months out of employ, and she has consequently lived upon a very poor and insufficient diet. On the 8th August, after exposure to wet, felt unwell, and had a rigor, which was followed with flushings, pains in the head, small of the back, and limbs; had some nausea and inclination to vomit.

On admission (sixth day of fever), complains of headache, dull pains in the back and superior and inferior extremities. No nausea; voice good; intellect unaltered. Sleeps badly, and is suddenly awakened by startling and terrific dreams. Has no appetite for

food; much thirst; skin feels hot and dry; tongue loaded and parched in centre, but moist at edges; bowels confined; urine rather scanty and high coloured. Some degree of tenderness is felt upon pressure over the epigastric and hypochondriac regions; has no other pain. Pulse 108, of pretty good strength.

Habeat statim Pulv. Jalap. Co. drachmam, Mist. Salin. ʒviij. cujus unciam capiat 4ta q. q. horâ.

Aug. 15th.—Had a copious sweat early this morning (being seventh day); all sense of pain and headache gone; has slept for several hours since sweat; bowels not opened since yesterday; tongue foul; pulse 84, and rather weak.

Summend. Pil. Col. Co. duas statim. Mist. Diaphoret. omittatur. Bibat cerevisiam ad Oj. quotidie.

Aug. 16th.—Skin moist and cool; tongue rather cleaner; pulse 80; still weak; bowels open.

Habeat Vin. Rub. ʒijj. Cerevisia contr.

17th.—Feels better to-day.

Vin. Rub. et Cerevisia contr.

18th.—Continues to improve.

To have common diet.

19th.—Continues to improve.

22nd.—Has had a relapse, which was ushered in by rigors, headache, pain in the extremities and over the loins; skin feels hot to the touch, and is harsh beneath the fingers; tongue rather dry; bowels confined; pulse 120.

To have low diet. Capiat statim Pil. Col. Co. duas, et habeat Mist. Salin. Omnia alia omittantur.

23rd.—Much the same to day; skin still hot and dry; bowels confined.

Pil. et Mist. repetantur.

24th.—Sweats to-day; feels much easier; bowels open; tongue moist, and pulse nearly natural.

25th.—States that she feels much better; bowels moved; tongue moist and not so foul; pains gone; slept well; pulse 84, but weak.

Mist. omittatur. Habeat Vin. Rub. ʒiv. omni die.

27th.—Continues to improve.

30th.—Complains of no pain, but is rather weak; symptoms generally favourable.

2nd.—Improves.

5th.—Convalescent.

REMARKS.—In the instance of Main it is stated that the initiatory symptoms of the distemper were of the ordinary character; that she had the critical sweat on the seventh, and relapsed on the fourteenth day, and that after other two days the disease again effected its resolution by sweating. After the crisis, the head became free

from pain, the pulse reduced in frequency, and some hours of tranquil sleep immediately followed. During the six days subsequent to the first crisis the apyrexial state was complete, the patient steadily improved, the tongue becoming cleaner, the bowels more natural, the skin being cool, the appetite being better, with other symptoms of amendment that were presented, until rigors, pain in the head, feverishness, a high pulse, etc., quickly induced the second attack.

A multitude of instances might have been given to show how regularly the crisis came on about the times above mentioned; so much so, indeed, that the critical period could almost with certainty be prognosticated, and this, it might with correctness be said, was universally by sweating. In genuine typhus the crisis does not take place until a much later period; on the seventeenth, twentieth, twenty-first, and even later still, we not unfrequently observe that symptoms of amendment are first manifest. In typhus it is after the fifth or sixth day before the patient seeks admittance at the hospital, while in the fever now described, by the fifth or seventh day a great majority of the cases had reached their greatest degree of intensity, and those fatal cases which did occur, were, with but very few exceptions, never later than the seventh day, a circumstance scarcely, if ever, witnessed in typhus. It was the remark of the late Professor Gregory, that during the whole course of a long and extensive practice, in no single instance did he remember a case of typhus terminating fatally during the first week. Here, then, we have an indisputable difference, powerfully arguing that the two forms of fever were essentially dissimilar.

On the appearance of the critical sweat, the increased temperature of the body fell in a ratio corresponding with the declension of other morbid symptoms; from being 106° or 107° , the short space of three or four hours would suffice to reduce it to its natural standard. In typhus and typhoid we never find such reduction of temperature effected with this unwonted celerity, and, as before asserted, the excretion is scarcely ever so copious, or where it is, death almost always follows. Instances of pure typhus have come under my own observation, when, perhaps about the fourteenth or fifteenth day of the disease, a profuse sweat has occurred; and what has been the sequel? Not the tranquil and refreshing sleep, the immediate cessation of pain, and the total arrest of the whole train of febrile phenomena, as incident upon such an occurrence in the epidemic, but a state of great prostration, pallor of the countenance, a weak and compressible pulse, and a general indication of sinking was mostly manifested, instead of the ameliorated condition so common to the seven days' fever. A case came under my notice fully verifying what is here set forth. A young woman, of hitherto good health, nineteen years of age, had contracted a fatal description of typhoid, and I first saw her on the twelfth day of her fever. When attacked she was in servitude, and more than twenty miles from her own

home. She had been bled by a practitioner in the town where she was resident at the time of the accession of the disease, but no intimation was given, either to herself or friends, that her affection was of the febrile kind. She was carefully conveyed home on the sixth day of the disorder, and a practitioner in her own neighbourhood was called in upon her arrival. She could now, though not without great fatigue, walk about the house, nor did she complain of any particular pain, but expressed herself as feeling excessively weak. This gentleman did not consider her case to be one of typhus, but merely some general disturbance incident upon slight cold, and obstructed catamenia. On my first visit, which was late in the night of the twelfth day, she complained of some degree of pain, on taking a full inspiration, in the right hypochondrium. It was stated that since her return home she had not been confined to bed, having been enabled to sit up in an easy chair over the fire, in the ordinary day-room of the house; and that, as before stated, she only complained of general debility and a sensation of sinking, with a powerless and enfeebled condition of the legs, and it was said there had been for the previous day or two unusual quickness of breathing.

The physician now attendant upon her recommended bleeding for the pain in the side. The pulse, it is true, was quick and of tolerable volume, but there was a peculiar feeling of irritability and want of resistive power to the touch, which, in my own opinion, very decidedly contraindicated the use of the lancet; consequently a dissent was urged against the proposed measure. Having made strict inquiries as to the previous history of the case, and from the general appearances manifested, there was no doubt whatever, in my own mind, that her affection, instead of being merely obstructed catamenial discharge, was veritable and undisputed typhoid, and that to have had recourse to general blood-letting, would inevitably have ushered in a state of hopeless collapse. She now began to sweat, and was ere long bathed in copious perspiration. Stimulants of wine and ammonia were ordered to be administered pretty frequently, and a sinapism to the affected part of the side applied. Her friends were warned of the perilous nature of her case, and strict injunctions enjoined that the remedies should be regularly given. The next (the thirteenth day), the flushed and febrile countenance, the suffused eyes and burning skin, had changed to a pallid and sunken expression, and general diminution of heat on the surface; there was a prostrate appearance, when the symptoms were generally viewed, which too truly foretold her precarious condition. The stimulants were continued, but increased in quantity, and given more frequently. On the morning of the fourteenth day I was not much surprised to find that she had become rapidly worse. The eyes were pale and blanched, and sunk in their foramina; congestion in the features, coldness in the extremities, with a scarcely perceptible pulse, formed the certain preludes to her fast approaching dissolution. She died in an hour from this time. The following case may here be given.

Mrs. S., a strong and hitherto healthy-looking woman, of about forty years of age, and had had six children, was attacked with rigors, pains in the limbs, headache, etc., on the 7th April. One of her daughters was now a convalescent after having had a malignant description of typhus. Mrs. S. was treated according to the ordinary principles, and nothing particular occurred in her case until the tenth day, when evident symptoms were manifest denoting a dysenteric complication. The usual remedies relieved this affection, although one or two slight returns came on at intervals for some days. On the eighteenth day of the disease, she appeared to be going on very favourably; the secretions were now more regular, the tongue, which had some days before looked preternaturally red and clean, and indicative of acute disease in the mucous surface of the digestive canal, which Armstrong says then much resembles "a newly dissected muscle," was more natural, and the patient expressed herself as better, and free from pain. The next morning (the nineteenth day of her fever), it was reported that she had had a very copious sweat during the night and early in the morning; indeed, so much so, that the nurse said that she was "bathed in perspiration." At the visit she looked pale and sunken; the pulse was still quick but of tolerable strength. Stimulants were now ordered to be taken pretty freely. During the next two days slight perspirations were noticed, though these were not in any very marked degree. The prostration, despite of the preparations of ammonia, and of the administration of wine and brandy, became greater. She lay in a helpless position in bed; the tongue was dry and dark, the teeth covered with sordes, and head affection had now supervened. Thus did the symptoms continue to become worse, and she gradually sank on the twenty-third day of the disease.

Some writers are of opinion that if the sweat take place when the skin is warm, and the secretion be not of the cold clammy description, that this circumstance does not portend danger. In my own opinion, however, when a powerful diaphoresis does occur at an advanced period in typhus, not mattering whether the surface continues hot, or warm, for a time or not, the very worst results may be dreaded, and more or less of prostration and feeling of sinking are the invariable accompaniments, and not the resolution of the disease, as spoken of in the relapsing fever.

The cases of these individuals form a good example of what is insisted upon above; viz., of the manner in which we are to apprehend excessive perspiration in typhus, when the disease has advanced, and we see that instead of being, as it was in the seven days' fever, the prelude to an ameliorated condition, it proved but the unwelcome forerunner of a helpless state of prostration, that readily terminated in a mortal issue. There were, it must be allowed, some negative facts connected with the early days of the disease, which might render her case somewhat ambiguous. The tongue was clean and moist; the intellectual faculties had never been at all disordered; and beyond a certain degree of fretful watchfulness, the

sensorium was but little disturbed through the whole course of the disorder; there was not much thirst, and, with the exception of the stitch in the side, no local pain was at all complained of. Yet, on the contrary, a general review of the case at once manifested positive signs infallibly denoting the febrile state; the pulse was accelerated, the breathing hurried; she had begun with rigors; there was impaired appetite, and a debilitated condition of the whole system, indicating that the vital powers were labouring under some great exhaustion and anormal influence, with an indescribable condition of the features, that manifestly showed the real nature of her complaint.

Dr. Henderson, who had taken notes during many years to ascertain, if possible, certain important considerations relative to febrile diseases, gives his opinion, that a copious sweat in typhus is generally a symptom fraught with the greatest danger; and according to that gentleman's experience, they very seldom recover when such event supervenes, especially if in conjunction with a quick pulse. "The critical discharge, or secretion, of the epidemic fever," says that author, "is a remarkable feature of difference between it and typhus. In a very few instances of typhus I have noticed a favourable change coincide with the occurrence of copious perspiration, but never a total cessation of the febrile state. In the great majority of instances, however, instead of copious perspiration coinciding in typhus with symptoms of amendment, it happens that it ushers in, or accompanies, a state of hopeless prostration, stupor, hurried breathing, and increased frequency of pulse."

In intermittent fever a powerful sweat acts very differently, and instead of being looked upon in the same manner in which it is regarded in typhus, we view it as the safe and salutary effort on the part of nature which effectually arrests the febrile paroxysm. In that form of fever the sweat cools the body, it lessens the volume of the circulating fluid (for we must remember that this secretion comes immediately from the blood), and thus, by being relieved of their tonic fulness, and the capillary spasmodic action being in a great measure overcome, the circulation is more equable, and the vital organs are freed from the evil effects of an over-supply of blood, which must otherwise produce congestion or inflammatory action; hence from this process of nature more grave and important symptoms are averted. Seeing, as it has been shown, that the copious sweat in the epidemic was almost as sudden, and the consequent apyrexial state nearly as soon complete, as in a case of the pure intermittent type; that the non-febrile condition continued but for a certain time, and that at the expiration of a few days the primary and identically similar symptoms noticed at the first invasion were again manifest on the return of a succeeding paroxysm, and that these alternations of the febrile and apyrexial state were not unfrequently repeated to the third, and, in some few instances, to the fourth time—it becomes difficult to dispel the idea that, in these particulars at least, there was a veritable resemblance between it and the fever of

the ordinary intermittent type. Allowing this similarity between the two, and from what is said above respecting the physiological and pathological changes which spontaneously take place in intermittent fever, thus may in some measure be accounted for the beneficial effects induced by the sweat in the epidemic.

In Table No. V., of the eighty cases there mentioned, out of the forty males, thirty-three had a well-marked critical sweat, which, in a summary way, arrested the febrile state; two had the crisis upon the fourth day, seven upon the fifth day, eight upon the sixth day, eight upon the seventh, five upon the eighth, two upon the ninth, and one upon the thirteenth day; this last case, however, which at the first was considered of the epidemic character, ultimately proved to be genuine typhus. Respecting the forty females, twenty-seven of that number had a diaphoretic crisis on the following days, viz.: five upon the fourth day, five upon the fifth, nine on the sixth, or early on the morning of the seventh, six on the seventh, one upon the eighth, and one upon the ninth day. Thus we see that amongst the males twenty-five had the crisis varying from the fourth to the seventh day, being 5-8ths of the whole number; that twenty-three of these twenty-five had the crisis from the fifth to the seventh day, being more than 4-5ths of this aggregate. Amongst the females, twenty-five out of the twenty-seven had the crisis from the fourth to the seventh day, being nearly 5-6ths of that number. In the general average, then, of these eighty cases, it is seen, that the critical sweat came on at about $6\frac{1}{4}$ days from the period of accession, or on the seventh day. In the table as under, the average date of the diaphoretic crisis was 6.48, or nearly $6\frac{1}{2}$ days.

TABLE VII.*—*This table gives particulars respecting 40 cases that were admitted into the hospital, from November 17th to December 29th, 1843.*

Males	16	1 in 2.5
Females	24	1 in 1.66
Average age of males	29	1 in 1.37
Average age of females	33	1 in 1.21
Occupation :—		
Servants and domestics	26	1 in 1.53
Labourers, operatives, etc.	14	1 in 2.8
Average duration of illness previous to entering the hospital		
Rigors during the invasion	38	1 in 0.5
Temperaments :—		
Nervous	6	1 in 6.66
Bilious	14	1 in 2.8
Sanguineous	2	1 in 20

* Two out of the above number had œdema of the inferior extremities to some extent; in one the spleen was exceedingly enlarged, and in another there was suppuration of the parotid gland.

Nervo-bilious	12	1 in 3.33
Nervo-phlegmatic	2	1 in 20
Bilio-phlegmatic	1	
Nervo-sanguineous	3	1 in 13.3
Head affected in a greater or less degree during the invasion	32	1 in 1.25
Abdominal complication, requiring active remedial measures	5	1 in 8
Average date of crisis by diaphoresis	6.48 or 6½ days.	
Yellow cases	4	1 in 10
Number that had one or more relapses before leaving the hospital	35	1 in 1.14
Sequele:—		
*Splenitis	4	1 in 10
Menorrhagia	2	1 in 20
Tumefaction of mammae	1	
Unusually severe arthritic pains	1	
Conjunctivitis before leaving the hospital	1	
Bronchitic affection	1	
Rheumatic and arthritic pains during convalescence	23	1 in 1.73
Average duration in the hospital	24¾ days	
Cured	39	1 in 1.02
Died	1	

V.—*The head symptoms were comparatively slight, being less severe than are generally observed in typhus; the brain and its membranes were not so often found the seat of lesion.*

The brain and its membranes are frequently affected in, and form a complication very common to, the fever of this country, and there is but little doubt that cephalic affection attendant upon continued fever is more fatal than any other complication of the vital organs; and those cases of the epidemic that went on to a fatal termination evinced, both by the symptoms during life and the morbid appearance on inspection, that disease in the brain and its membranes formed the proximate cause of death—that is, in the generality of instances—although unquestionable proofs were given that some died where not the least cephalic affection existed. Dr. Alison, when speaking of the manner in which the fatal issue immediately supervened in the seven days' fever, says that "embarrassment of function and alteration of structure of some organ, *generally the brain*, caused death." The sensorial functions in continued fever are always more or less disordered, and the intensity of their affection varies according to the mild or malignant character of the disease, the kind of complication, and the idiosyncrasies of the patient. In this respect there was a manifest difference between the epidemic and

* It might perhaps have been more proper to arrange these four cases of splenitis under the head of complication, but as the organ did not become reduced to its normal size for some time, the affection is thus placed as above.

the form of fever strictly termed typhus. Great delirium, low incoherent muttering, dulness of hearing, imperfection of vision, tremor of the tongue, picking of the bed-clothes, etc., were scarcely ever noticed in the ordinary cases of the seven days' fever, so that the description of Huxham, when giving the signs of typhus, where he says—"Omnes corporis sensus maxime depravantur; vix egri vident oculis apertis, perditur olfactus, perditur auditus, vix etiam sapidissima gustent, torpent adeo membra ut parum admotum sentescant vel accerrima vesicatoria," could with little aptness be applied; except, perhaps, in the most severe and fatal cases. When we consider what vitally important organs the brain and spinal marrow are in the animal economy, and how intimately connected they are with the great processes so indispensably necessary not only to health but life itself, that their disorder is momentarily conveyed to the most remote parts of the frame, it may then be readily imagined how any morbid condition, located in those great centres of the nervous system, must influence and peril those functions upon which life directly depends.

When grave changes are going on in the encephalon, other and co-existent complications are then liable to be either overlooked or not sufficiently regarded; but when the brain is free from any serious disorder, then the symptoms denoting disease in the thoracic or abdominal viscera become so prominent as to fully warn us of their presence and extent. Thus it was in the fever now treated of. The hepatic region, as the liver was so frequently affected, was generally referred to by the patient as being the seat of the greatest suffering. In a very great majority of the cases which came under my own observation the head was so slightly disordered as to require but little attention; it was generally an *aching* that was complained of, and the manifest symptoms were those of vascular excitement, rather than the more important ones of a further advanced stage. With a view to cleanliness, and the comfort of the patient, the head was generally shaved on admission, which, with the application of cold, mostly sufficed as remedial measures; in more urgent cases, however, half a dozen or eight leeches usually afforded the desired relief. There was, for the most part, a good deal of watchfulness, the sleep was disturbed by sudden startings or terrific dreams, and immediately on awaking slight delirium would be apparent. Upon reference to Table No. VI., it is shown that 350 out of 450, being 1 in 1·28, or about 1 in $1\frac{1}{4}$, or 4 out of 5, had more or less of head affection, this seldom consisting of anything more than the symptoms before described. In Table No. VII., 32 out of 40 cases, being 1 in 1·25, or 1 in $1\frac{1}{4}$, had the disorder in question; and in Table No. VIII., 54 out of 80 cases, especially during the first days of the disease, complained of the head, being 1 in 1·5; and out of that number, 14, being 1 in 1·57 of the aggregate, required the application of leeches. The post-mortem appearance of the brain will be alluded to hereafter.

VI.—*A very great majority of the cases had pain and tenderness over the hypochondriac and epigastric regions, and sickness and vomiting were almost constant symptoms during the commencement of the disease.*

The numbers of patients who were afflicted with pain and tenderness over the hypochondria and epigastrium were so great as to render these well-nigh universal symptoms; and if even slight pressure was made, there were but few instances among them who did not then experience more or less pain in these localities. Sickness and vomiting were generally associated with the symptoms described, and the matters ejected were mostly of a darkish green; the degree of colour varying, however, according to the quantity of liquids taken into the stomach. Sometimes the pain in the epigastrium was complained of more than at the hypochondria, and in such cases the vomiting was generally more severe and persistent; and in those persons in whom the pain was chiefly located in the right hypochondrium, a jaundiced condition was very frequently observable. During the first two or three days of the fever, the sickness formed a very predominant feature; the patient would often lay his hand over the stomach, and complain of a weight or sensation of loading, and frequently everything taken would be quickly rejected during the first forty-eight hours. After the third day this distressing symptom would often be greatly mitigated, or have entirely vanished. Occasionally mere nausea was complained of, but upon interrogation it was generally ascertained that the preceding symptoms had been more urgent. The stomach being so commonly affected as it was in the epidemic, there were strong reasons for the supposition that some other organ was primarily affected; and this was undoubtedly the liver. Where the hepatic viscus was so frequently disordered as it was in the seven days' fever, the gastric affection was easily accounted for; the liver being morbidly distended with an undue secretion of bile, the bilious matter, by a reflex action of the duodenum, would be conveyed into the cavity of the stomach, on the internal surface of which any such irritant as the secretion in question could not fail to produce the sickness that was so commonly noticed. Idiopathic gastritis is an exceedingly rare disease, and indeed some authors have gone so far as to assert that it never occurs unless some irritant has been taken, or some neighbouring or other organ primarily affected, as by hepatitis, peritonitis, podagra, etc. In remittent fever, sickness and vomiting constitute a leading feature in the complaint, and in this disease the morbid state of the liver is the undoubted proximate cause of these symptoms.

In Table VI., out of 450 cases there given, 273 had pain and tenderness over the epigastrium, associated with sickness and vomiting, being 1 in 1·6, or about ten cases out of every sixteen; and the proportion would undoubtedly have been far higher had the cases been seen from the first day of the disease, or if they could have

been admitted into the hospitals at an earlier period of the fever. In Table VIII. it is shown that 56 out of 80 cases—being nearly 6-8ths of the aggregate—had nausea or vomiting during the stage of invasion. The subjoined case may here be given:—

CASE IV.—*Gastric affection, with hypochondriac tenderness.—Crisis by diaphoresis.*

Margaret Collins, æt. twenty-eight, married, hair and eyes dark, is not at all reduced, and of healthy constitution. Admitted July 22nd, 1843.

States has never laboured under any severe disease, with the exception of small-pox, this being many years ago. On the 16th July, first experienced the accession of her present indisposition, which manifested itself by rigors and flushings, followed by headache, pain in the shoulders, extremities, and over the lumbar region, with a good deal of nausea and vomiting.

On admission complains of same symptoms; has great pain and tenderness on moderate pressure over hypochondria and epigastrium. There is great muscular debility, anorexia, much thirst, breathing accelerated, and full inspiration is performed with some uneasiness and difficulty. No cough, nor any expectoration. Sleeps indifferently, and seems fretful. Bowels open, tongue loaded with a whitish-yellow pasty-looking coat, but is generally moist. Pulse 124.

Mist. Salin. Diaphoret. ʒviiij. cujus cap. ʒi. 4ta. q.q. hora. Vespere habeat haust. cum Sol. Mur. Morph. gt. xxx. in aq. ʒiss.

July 23rd.—Perspired very freely during last night; feels much easier; skin cool and moist; breathing unattended with pain; tongue clearer. Pulse 88, of tolerably good strength. Sickness in a great measure arrested.

24th.—No particular change since yesterday; to have

Morph. Draught repeated at bed-time.

25th.—Feels much easier; less tenderness at epigastrium; does not complain much of nausea. Says she is very weak.

Habeat Vin. Rub. ʒiv. in die. Vespere. haust. Morph. ut antea. Alia medicament. omittantur.

26th.—Is rather better; bowels confined.

Ol. Ricin. ʒvi. statim sumend. Vin. Rub. Cont.

27th.—Pulse natural; continues to improve.

28th.—Improves; tongue moist; pulse 72. Complains of some degree of pain in right hypochondriac region, which extends to epigastrium.

Sinapismus statim parte aff. appd. Hab. Linetus opiatus.

29th.—Skin moist; tongue clean; pain in hypochondria and epigastrium relieved by mustard poultice; in all respects is carried on favourably.

31st.—Complains of much pain to-day over epigastrium, which is aggravated by slight pressure. Tongue rather dry; bowels confined; skin hot, and feels pungent to the fingers. On examination, right hypochondriac region seems a little full, and on percussion elicited sounds are less clear and sonorous than normal. Has had some vomiting of a greenish bilious-looking liquid. Pulse 120.

Hirudines viii. epigastrio appd. Mist. Salin. Diaph. ut antea Ol. Ricin. ʒvi. statim sumend. To be put on low diet.

August 1st.—Pain at stomach relieved by leeches; bowels open; tongue still dry; skin feels hot and burning. Slept only moderately last night. Pulse 128.

Mist. Contr. et Vespere habeat haustum cum. Sol. Mur. M. gg. xxv. in aqua, ʒiss.

2nd.—Did not sleep well during fore part of night; sweat this morning, and has slept for several hours afterwards; skin cool and moist; bowels rather confined. Pulse natural; still some pain in stomach; and has occasional vomiting.

Enema domestica statim injiciatur.

3rd.—Skin cool and moist; some vomiting still, at intervals. Pulse nearly natural, but rather weak; bowels open; tongue cleaner.

Cerevisia Oj. per diem. Pulvis effervescent. subinde.

4th.—Pulse natural, of better strength; has had no vomiting to-day. Bowels open. Complains of some muscular pains, and has an aching of the right shoulder.

Liniment. Saponis c. Opio humeri dext. applicand. bis terve die. Pulvis efferves. Linctus opiatque cont.

4th.—No more vomiting; complains of no pain. Pulse 80; tongue rather dry at edges, but moist and clean at apex and edges; bowels open.

5th.—Much the same as at last report.

7th.—Continues to improve.

10th.—No pain; bowels open; free from sickness; tongue and pulse natural.

May have common diet.

13th.—Continues to improve; no return of pain or vomiting; tongue clean; pulse 74.

15th.—Improves.

18th.—Goes on most favourably. From this time she continued to mend, and in a few days subsequently was dismissed from the hospital.

REMARKS.—It is reported, in the above cited case, that the attack was ushered in with a good deal of nausea and vomiting; that on examination there were pain and tenderness on moderate pressure over the hypochondria and epigastrium; that on the night of the sixth, or early on the morning of the seventh day, diaphoresis in a

summary manner cut short the febrile state ; that the pulse fell from 124 to 88 in the course of a few hours, and with such reduction an attendant improvement in the general symptoms was observed, and in particular that the sickness was greatly relieved. On the 28th the right hypochondrium and the epigastrium were still tender, which affection was, however, benefited by the sinapism. On the 31st (being the fifteenth day) the relapse had evidently set in ; the pulse quickly rose to 120, and the vomiting again returned, the matters ejected consisting chiefly of a greenish bilious fluid. Two days from this date the disease was again resolved in the usual manner, viz., by diaphoresis ; but still, although the apyrexial state seemed complete, as evinced by a return of natural pulsation, with certain negative indications, the pain in the stomach, with occasional vomiting, continued, and was of an obstinate character. In the report of the 31st it is stated that there was dulness of the right side, and on the 4th August it is mentioned that there was an aching of the right shoulder,—significant signs of hepatic congestion.

This case was certainly one where the gastric complication was of an unusually persistent nature, and, as before asserted, the sickness, in the majority of instances, was only observed during the first days of the fever, and it almost always became effectually arrested on the supervention of the critical perspiration.

Respecting the pain so frequently complained of in the left side, such might mostly with correctness be attributed to disease of the spleen, which was so unusually common in the fever. Were we but possessed of more decisive knowledge as to the true nature of the spleen in the animal economy, its pathological conditions would be better understood. If we are to consider, with most physiologists, that it acts as a kind of reservoir to the circulation carried on in the abdominal viscera, and that its distensible qualities avert the evils which might accrue to certain of these visceral organs from an irregular distribution of blood, we can at once perceive the manner in which it becomes enlarged in intermittent fever ; and the same line of reasoning is equally applicable relative to the epidemic, seeing that the latter bore certain resemblances to the former. In an intermittent the powerful fits of shivering determine the blood from the surface in anormal quantity to the internal parts, and, as before stated, this viscus, under such circumstances, is capable of taking up a large quantity of superfluous vital fluid, which is thus thrown upon those organs ; and which, were it not for the provision that nature has thus supplied, must have acted much more deleteriously ; and, as rigors were so exceedingly common in the epidemic, as also relapses with other features simulating the intermittent type, it seems a plausible inference to be arrived at, that the spleen was morbidly enlarged from the operation of causes pretty similar to those producing its congestion in an intermittent.

Some physicians have contended, amongst whom may be named M. Piorry, that an inflammatory condition of this organ is the sole

and prime origin of intermittent fever, and that the whole of the phenomena presented by that form of the disease originate in, and immediately depend upon, such morbid condition. This localistical doctrine, however, is manifestly untenable, because an intermittent may be apparent previous to a morbid enlargement of the spleen; because the diseased condition of it is not by any means uniformly in proportion to the degree of intensity of the fever; because its inflammatory state in an intermittent is often exceedingly doubtful, it being in general merely congested, and because we are not aware that any remedial means that we possess, which is singly directed to that organ, could abruptly check the progress of the fever—a circumstance that ought to follow as a natural sequence if the views of M. Piorry and others were correct. Again, the curative measures employed in cases of acute splenitis, that were noticed in the seven days' fever, did not cut short the pyrexial symptoms of the idiopathic fever, did not prevent a relapse, nor in any way materially alter the general features of the distemper.

Acute inflammation of the spleen is a rare disease, more especially now that intermittent fever in this country has become so uncommon, and acute idiopathic inflammation of its peritoneal covering is so seldom noticed as to be considered by some authors as never occurring. Its most common form of disease is a mere apyrexial state of congestion, or a chronic inflammatory action that may continue for some years, which generally terminates either in a black degenerated mass, of soft pulpy consistence, or, which is the most seldom, ends in suppuration; this last form, however, is but very rarely observed. In the seven days' fever, several and some well-marked cases of acutely inflamed spleen came under my notice, and some of these went on to a mortal termination, or at least seemed importantly concerned in the induction of death. I then saw many instances where the organ had increased to three or even four times its natural size, and in my own humble opinion there is little doubt that this organ was more frequently affected than has been noticed in any recent febrile visitation. I am aware that the spleen is sometimes considerably more enlarged; yet in those cases it has generally been preceded by, or accompanied with, intermittent fever; and under such circumstances it has gained an incredible size, instances of which are mentioned by Lieutaud, Franc, Wardrop, L'Hermite, etc. Splenic disorder is generally and with much correctness considered as a secondary and not a primary disorder, such being dependent, as a justly celebrated writer observes, "upon deficient energy in the system, particularly of the vital organs."* Between the liver and the spleen there is a very remarkable sympathy, and there is mostly, if it be not said uniformly, demonstrable disease of the former associated with that of the latter. We are accurately aware that between some organs of the body (and in some instances when they are remotely located from each other) there are peculiar and unaccount-

* Annesley, "On the Diseases of India."

able sympathies, as between the mucous membrane of the digestive canal and the cutaneous tissue, the testes and larynx, the uterus and mammæ, etc.; and, undoubtedly, there is very great sympathy between the viscera now considered, by which may in some measure be accounted for their simultaneous affection.

Dr. Henderson, at an early period of the seven days' fever, had witnessed no less than eleven well-marked cases of acute splenitis, and if particular attention had been given, in order to discover the exact ratio in which they occurred, there is little doubt that the complication in question was very high, and indeed so much so as to render this affection, and its unusual frequency, one of the distinguishing peculiarities of the distemper. Dr. Cormack, in his work, notices the complication, but concludes that the organ was *not* inflammatorily distended, but in a state of mere congestion. There were certain cases presented to my own inspection where decided pyrexial symptoms were apparent, and only referrible to the local cause, because they become manifest during the remission, after the idiopathic fever had been clearly and effectually resolved by the usual critical sweat, a fact evidently proving that unequivocal inflammation was *sometimes* witnessed in this organ, although it must be allowed that simple congestion was by far its most frequent condition; yet what is endeavoured to show is, that its actual inflammation was not very uncommon in this fever. In those cases which I saw there were sharp lancinating pains, and dulness on percussion over the splenic region, and this dulness would sometimes extend over a space three or four times as large as when the organ is of its natural size. In some few instances the dulness reached so far as nine inches from the spine to the latero-anterior aspect of the thorax, and six inches in perpendicular. In these cases cupping and leeches, with calomel and opium, for the most part quickly reduced the circumscribed dull sound; and I have seen the line of dulness (after having been mapped out by means of the pleximeter) reduced to an inch or an inch and a half in diameter in the course of twenty-four hours; and with such diminution of bulk the symptomatic fever has declined in a proportionate degree, evidently proving that the organ was inflammatorily distended. That the affection so common to this viscus during the epidemic was not at all times merely congestion, the following testimony may be cited from an account given of the fever by a physician who witnessed much of the distemper:—"That the enlargement of the spleen," says the writer, "was not the result of ancient organic disease was abundantly evident from the usually rapid decline which followed leeching the hypochondrium, and the other remedies which were used. In some cases the affection occurred during the existence of a paroxysm of the fever; in others it happened after the paroxysm was over, and was ushered in and accompanied by a proper symptomatic fever, differing from a paroxysm of the epidemic fever in this, among other circumstances, that it yielded speedily to the local remedies that were addressed to the spleen, and subsided along with

the latter." The foregoing statement at once proves the nature of the affection so frequently noticed with regard to this viscus, although, as before advanced, its active inflammation might be considered as the exception, and simple congestion, to a greater or less extent, the rule. An instance illustrative of this complication may here appropriately be inserted.

CASE V.—*Acute splenitis.*

Mrs. Leeson, æt. thirty-eight, married; had eleven children; spare habit; admitted March 29th, 1844; states that she became affected with headache, pains in the limbs, and rigors, on the evening of Monday last (25th). One of her daughter had the epidemic, and is at present in the wards. Has had occasional sweats since the accession of her illness, and also at various times had sickness and vomiting. Has not complained of any epigastric tenderness before to-day.

April 3rd.—On pressure over epigastric and hypochondriac regions, much tenderness is experienced. Percussion over left hypochondrium for four and a half inches vertically is dull, and the dulness extends forwards from the vertebræ along the lower margin of the hypochondrium to the epigastrium. Nothing can be detected below the margin of the ribs. On the right front the hepatic dulness begins at the fifth rib, and extends below the margin of the hypochondrium. A particular examination cannot be attempted on account of the acute pain which is experienced on the least pressure. Has had some diarrhœa from the commencement of her attack, and yesterday had frequent calls to stool, with tenesmus, without any passage of fæces, but some greenish mucus was voided. During last night was only once called to stool, and the evacuation consists of mucus, though somewhat mixed with feculent matter. No tenderness in abdomen, except as already specified. Urine said to be in good quantity, but not kept; much thirst; tongue dry; skin universally of a dingy yellow, which appearance first became manifest the day before yesterday. Is languid and feeble; no delirium; was leeches at the epigastrium, which produced slight relief.

R Nitratis Potassæ ʒj.; Aquæ ʒvj. Sit Mist. Cap. ʒj. 4ta. q. q. horâ.
Habeat Sp. Communis, ʒiv.

April 4th.—Continued much in the same state until a few hours before death, which occurred at six o'clock this morning. Had no coma nor delirium, and was quite sensible until four o'clock.

Sectio Cadaveris, April 5th, 1844, thirty-three hours after death.

Body a good deal emaciated; surface suffused universally with a dingy yellow.

HEAD.—*Brain*: Superior surface of dura mater tinged here and there with yellow patches. No unusual vascularity of pia mater; nor does the cut surface of the brain present any unusual number of bloody points. The serosity in ventricles amounts to ʒj $\frac{3}{4}$.

THORAX.—*Lungs*: The left lung is considerably smaller than the

right, and firmly connected to the parietes of the chest throughout by old adhesions; it is a good deal congested with blood, but crepitates freely on pressure. The right lung is free from adhesions, and is somewhat emphysematous at its apex and anterior surface. On its posterior aspect there is a good deal of congestion, but crepitation is distinct. The apex and upper lobes generally contain a considerable number of calcareous and putty-like concretions.

ABDOMEN.—*Liver*: This organ projects considerably beyond the right hypochondrium; weighs five pounds four ounces; its colour is uniformly of a pale ochre yellow. Blood oozes from fresh cut surfaces, but only from considerable vessels; on pressure, a little blood, mingled with a yellow fluid, may be expressed generally when a fresh section is made; its consistence is soft, and very friable. *Gall-bladder* is flaccid, but contains a considerable quantity of tenacious, viscid, dark-greenish looking bile. *Ducts* pervious. *Spleen* is loose in its situation, and presents no appearance of lymph on its surface. The appearance of a section of it has a great resemblance to raspberry jam; easily lacerable, and of soft consistence, but is not diffuent; scattered throughout its surface there are a number of minute whitish specks; weighs twenty ounces. *Kidneys* are somewhat flaccid, elongated in their form, and smooth upon their surface; of a pale yellow colour; cortical substance presents its usual characteristics, nor is it contracted in depth.

Other organs and structures do not present any uncommon or diseased appearance.

REMARKS.—In the above detail of this woman's affection, we see that the symptoms of the disorder were, at the invasion, of the ordinary character. There was pain produced by pressure over the hypochondria and epigastrium; percussion demonstrated a morbid extent of dulness over the splenic region, correctly indicating the great size of that organ. The pain and tenderness extending from the right hypochondrium to the epigastrium denoted a diseased condition of the liver,—a circumstance of some consideration, inasmuch as disease of the spleen is well-nigh always, and it might be said invariably, associated with a morbid state of the hepatic viscus.

The post-mortem appearances are interesting, inasmuch as they fully verify the diagnostic symptoms. The brain and its membranes presented very nearly the ordinary character, and the serous exudation was found in unimportant quantity. The appearance of the lungs, though manifesting a morbid condition of long standing, was by no means such as to induce a mortal issue. The left was considerably smaller than the right, and firmly bound to the chest by old pleuritic adhesions; but we know that life can be supported, and it might almost be said that health is not incompatible, with a considerable obliteration of the pulmonary organs, and individuals have been known to live many years when the respiratory function was carried on by one lung alone. Again, those who have had much opportunity of making post-mortem examinations are well aware

of the very frequent occurrence (and often when quite unsuspected, existing to a considerable extent) of organized bands of lymph firmly uniting the pleura costalis with the serous investment of the lungs, so much so that it might be deemed that such were capable of seriously interfering with the natural functions of these organs. The congestion spoken of might in a great measure, if not solely, be attributed to gravitation, and was perhaps to a very much less extent during life. The liver, it is seen, weighed more than its ordinary weight. The fluid that oozed from the surfaces of fresh sections was of a character similar to that which is generally observed when there is a redundant secretion. The cut surface was of a pale ochreish yellow, as if blended with an olive tint, and the organ itself was soft and friable. The gall-bladder was preternaturally distended with an increased quantity of bile, although there was no obstruction in the ducts,—a fact showing that its contents were given off in a morbidly increased manner. The spleen was loose, and resistless to the touch. Its almost diffuent consistence, and weighing from three to four times that of its natural size, readily demonstrated the degree of morbid action with which this organ had been affected. The whitish spots were undoubtedly small depositions of pus; and from the appearance of these pustules it is plausible to suppose that, had the patient survived for some time longer, the organ might have gone more completely into the suppurative state, although such termination, as previously asserted, is exceedingly uncommon.

VII.—*There were an unusual number of jaundiced or “yellow cases,” and with these were often associated a dark, coffee-grounds-looking (and in some instances black) vomit.*

An icterous condition of the skin, when associated with black vomit, are by most writers * considered as the grand and distinguishing characteristics of the true Mediterranean and West Indian yellow fever. Other authors, however, who have witnessed much of and described that disease, do not attach such paramount importance to the symptoms mentioned, but rather form their diagnosis from an assemblage of symptoms than from those two particular states.† It is abundantly evident, when those symptoms do occur, that the mortality is then very high; and this fact has been observed from the earliest times. Yellowness‡ of the surface is sometimes met with, though seldom in the ordinary continued fever of this country;§ and there is scarcely any great febrile visitation on record where a certain proportion of jaundiced cases, however small, are not noticed; yet, upon a thorough investigation of the cases manifesting this symptom, it would generally be found that some ancient lesion in, or particular cause of predisposition of, the liver existed, that would

* Père Dutertre, Monro, etc.

† Picknard, Jackson, and others.

‡ Hippocrates, I., IV., and XII. See. Prognostics. Celsus, Galen, etc.

§ Christison, Tweedie's “Lib. Pract. Med.”

readily, under the influence of an acute disease, develop the jaundiced condition. When, however, it occurred so frequently as it did in the seven days' fever, and where no traces could be ascertained of any previous disorder in the biliary apparatus, we are compelled to attribute the disorder in question rather to certain specific and inherent properties in the nature of the poison giving rise to the disease, than to casual circumstances. Some of the Scotch physicians were of opinion that the distemper was veritable yellow fever, to which, as will hereafter be shown, there were some tallying diagnostic marks; yet at the same time there were negative facts arguing weightily that the two forms were not identical.

Those who have described that particular kind of disease common to the shores of the Mediterranean and the West Indian Islands, variously known under the names of *Fièvre Matelote*, *Bulam-Fever*, *Mal-de-Siam*,* *Vomito Prieto*,† *Yellow Fever*, etc., record an affection which, during its visitations, is generally of the most fatal character; indeed, in some attacks, its mortality has been quite appalling, and in every respect deserving the epithet pestilential; and we find that most of the older Spanish authors call it a pest.‡ The accounts given of the yellow fever by Wilson, Chisholm, Bancroft, Blane, Gillkrest, Burnett, Fraser, Henner, O'Halloran, Veitch, Denmark, Boyd, etc.; by various foreign authors, amongst whom may be noticed Salva, Rush, Humboldt, Palloni, Tommassini, Gastelbondo, Hurtado, Pariset, Arejula, etc.,—all of these assert the yellow fever to be a most fatal distemper, and we find, from the accounts given by the majority of these authors, that mortalities in different parts of the world to which it is common have been as great, even in recent years, as the plagues and pestilence of earlier times.§

When we remember that in the relapsing fever there was a very unusual number of yellow cases; that some of these were not merely tinged, but varied in every degree of intensity from a lemon hue to an ochre yellow; and that in some instances death was preceded by the vomiting of a inky-looking fluid; that dark livid petechiæ were common, and vibices sometimes observed; that these yellow cases were far more fatal than the ordinary form of the fever without this complication; that the symptoms in question hurried on with great rapidity, together with other considerations,—we are compelled to admit that the fever known at Gibraltar, Malaga, Barcelona, Seville, Barbadoes, Jamaica, Demerara, etc., was in no slight degree resembled. Upon a more rigid examination of facts, and on a more extended view of the question considered, it then seems impossible to conclude that the epidemic of 1843-44, and the true yellow fever, were really identical. 1st. Because the yellow fever, when it has

* Père Labat.

† The Portuguese term for *black is prieto*.

‡ Garcia, Suelto, Villalba, Porcel, etc.

§ Harness, Monro, Gray, Classe, Piendo, Johnson, Alfonzo-de-Maria, Bone, etc.

manifested itself in a distant country, has generally been traceable to such country by means of shipping, and the first cases were mostly confined to the neighbourhood of the harbour or docks of such place of importation,—facts not mentioned with regard to the Scotch fever. 2ndly, Most writers attribute its propagation so much to the influence of malaria, as to affirm that where the yellow fever breaks out there has often been some prominent and indisputable cause of such malaria, as by the inundation of a river, the cleansing of docks, the turning-up of large quantities of fresh soil, etc. 3rdly, It usually prevails but in hot seasons, after the atmospheric temperature has reached a certain degree of heat,* and it is in general effectually checked on the setting-in of cold weather. Now the very first cases of the Scotch epidemic were noticed in Glasgow in the month of December 1842, and from this time continued to increase. 4thly, In yellow fever a very great proportion of the cases are more or less yellow, while in the relapsing fever the greatest average in the Edinburgh hospitals was one in eight, although in Dundee, at one period, it ran so high as about one in four.† 5thly, Black vomit is the frequent prelude to death in the one form of disease, whilst it was only in a few rare instances seen in the other. 6thly, Almost all writers whom I have read on yellow fever mention as a diagnostic symptom great injection and redness of the eyes,‡ a characteristic in the epidemic usually absent. 7thly, In the description of disease that rages in the countries on the Mediterranean and in the West Indies, death often takes place within forty-eight hours, and mostly about the end of the third day; but I do not remember a single instance in the distemper now treated of in which a mortal issue supervened so soon. 8thly, and lastly, The average mortalities in yellow fever epidemics are, as above noticed, often very high, the proportionate number of recoveries being a mere fraction, whilst in the seven days' fever the average of deaths was very small.§ From these facts we can scarcely become reconciled to the opinion propounded by some who paid much attention to the Scotch fever, that it was essentially the same distemper as that common to the places spoken of abroad; although, as advanced before, coincidences seemed manifest that were not easily explained away.

Upon reference to the work of Welsh, before quoted, it is shown that the proportion of yellow cases in the fever which he has described was as 1 to $30\frac{23}{24}$,|| and this symptom was observed in about 1 in $8\frac{1}{2}$ of the fatal cases. In my own statistics it will be found, upon referring to Table No. IV., that out of 330 cases, 37, or 1

* It has been remarked that the yellow fever in Philadelphia does not rage unless the temperature be 79° Fah.

† Vide Tables IV., V., VI., VII., and VIII.

‡ Rush, Thompson, Gillkrest, etc.

§ Article "Yellow Fever," in "Cyclopedia of Pract. Medicine."

|| Welsh, "On Fever," p. 73.

in 8·91, were yellow; in Table V., out of 80 cases there were 7, or 1 in 11·42; in Table VI. (compiled in January 1844), out of 450 cases, 28, or 1 in 16·07, were yellow; in Table VII., there were 4 out of 40, being 1 in 10; and in Table VIII., which was formed in April 1844, at the decline of the epidemic, and which gives particulars respecting 80 patients, only 2 of that number, 1 in 40, were decided yellow cases. Now these statements are worthy of some attention, as we see that in January 1844 the proportion was nearly threefold greater than in the month of April of the same year, when of course the temperature could not fail to be several degrees higher. In the aggregate of yellow cases, as extending over a period of many months, out of 989 patients 78 were jaundiced, being 1 in 12·66 of the whole number. Dr. Christison, when writing on fever, says that the complication of jaundice is a rare affection, and asserts that it is most frequently noticed during the autumnal months; the last assertion is fully verified by my own data from time to time given in this account. Some physicians have contended that the complication of jaundice is of most usual occurrence in those epidemics which are of an inflammatory type. Now the fever of 1817-20 was of a far more sthenic character than that of 1843-44, yet the number in the former was considerably less than that in the latter, which could not be considered of the inflammatory order, but rather belonging to the asthenic or adynamic type of nosological classification. These apparent inconsistencies amid the phenomena of febrile diseases are so difficult of solution, in the present state of our knowledge, as to render our wisest reasonings too often abortive and erroneous; nevertheless, if we could but penetrate into the arcana of nature, all those multifarious effects which, when their causes are imperfectly understood, so puzzle and perplex the acutest minds, would then seem legitimate and highly probable conclusions, nor would any effect be manifest without its precisely correspondent power of causation; and it is by the constant and careful observation of the operations of nature, the reflective study of the manner in which she works her ends, that those results which the world terms discoveries are made, that the researches of science are enlarged, and our capabilities of contending with the ravages of diseases increased and strengthened.

The first appearance of the accession of jaundice manifested itself in the conjunctivæ, which were at first slightly tinged, and then increasing in different degrees of intensity. The neck, face, chest, arms, abdomen, and inferior extremities, then became affected, being at the onset of a light yellow hue; and on the complication being fully developed the surface would in some instances assume a deep ochre-yellow, in others a dusky yellowish-brown, resembling somewhat a mahogany shade. These conditions were never so markedly observed in the inferior extremities, especially about the feet and ankles, as in the other parts of the body. Some degree of pain and tenderness was universally experienced in the hypo-

chondria (mostly in the right side) and epigastrium. There was vomiting of a dark-greenish, bilious-looking fluid, generally in large quantity; and in a few odd cases the ejections were black, grumous, and coffee-grounds like, being about the consistency of hare soup; and in one instance which I saw this description of fluid deposited a sediment of inky blackness, which, upon pouring off the supernatant liquid, had a gelatinous appearance, and was somewhat tenacious to the touch; this patient in the course of thirty hours vomited not less than some quarts. The bowels were scarcely ever constipated, and the stools were always of a dark colour, manifestly being loaded with bile often mixed with mucous matter, and sometimes with a black deposit, having the appearance of coagulated blood, similar to that which is witnessed in undisputed cases of *mekena*. The urine was high coloured, and when in the vessel resembled porter; it tinged linen of a saffron yellow. In some of the worst cases the bed-linen became stained of a yellow colour from the perspiration.* The tongue at the first was covered with a yellowish-white, thick, pasty coat, the apex and edges being clean; this fur, as the affection reached its maximum, became dry, and ultimately of a dark brown or black colour, being cracked and fissured in the centre. On percussion the dulness in the right hypochondrium was to an anormally great extent, and the edge of the liver could frequently be felt protruding below the false ribs.† The skin was hot and dry, sometimes imparting a tingling sensation to the tips of the fingers. In such cases as went on to a fatal termination coldness of the surface, a quick small pulse, hurried breathing, great prostration, contracted pupils, delirium, and coma, were the preludes to dissolution. The urine was often voided in decreased quantity, especially in the worst cases. The parts to which blisters were applied, if in very yellow cases, would on their removal become of a dark blackish brown. Petechiæ were frequently observed, and vibices sometimes noticed; the latter, however, being more rare than the former. Hæmorrhagic discharges by stool were more common (though these were by no means very frequent) than from any of the other internal cavities. In the milder description of yellow cases but little additional disturbance seemed to be added to those already created by the idiopathic fever, although an abundant secretion of bile was well nigh always detected in the alvine evacuations. Such is a brief outline of the leading pathognomonic conditions presented by the jaundiced cases which were presented to my own inspection.

In this part of the subject there are certain considerations which naturally suggest themselves, and to which it may here be well to make a brief advertence.

I. *Was the jaundiced condition in question always preceded*

* Flores Moreno mentions this as sometimes being observed in yellow fever.

† "*Difficili bile tumet jecur.*"—*Hor.*

by idiopathic hepatitis, or some organic change in the liver, and did it primarily depend upon such morbid states?—On a careful examination of a great number of cases which I had an opportunity of seeing, there was, as previously asserted, some degree of tenderness experienced in the right hypochondrium, which might most expressively be termed a dull, heavy, aching pain; nor did the degree of this seem always proportioned to the intensity of the yellowness, and other accompanying symptoms. Scarcely at any time was that sharp lancinating pain complained of, which is so symptomatic of the serous investment being inflamed, but the symptoms presented gave evident indications of an engorged state of the viscus, which was undoubtedly its real pathological condition. The stools were not clay-coloured, as we see in some diseases of the liver, but always surcharged with bile. If it had proceeded from idiopathic hepatitis, bleeding, leeches, cupping, etc., would have checked the inflammatory action, and with such abatement arrested the progress of the concomitant states; such, however, was not the case, and therefore little treatment was addressed to the region of the viscus, as the primary cause evidently did not wholly exist in this organ, nor was it owing to obstruction in, or pressure upon, the gall-ducts, as they were always pervious, and filled with their proper secretion. Jaundice, as most are aware, is sometimes occasioned by an inertness of, and the want of proper functional power in, the liver; in cases of abscess, tumours, and other morbid products being produced in its structure, and causing pressure on some of its excretory canals, in diseases of the lining membrane of the duodenum, etc.; yet none of these conditions were found to account for the yellowness so commonly observed.

II. *To what pathological causes was the condition in question proximately owing?*—If the jaundice had been produced by non-elimination of the bile from the blood, it is fair to presume that the effects upon the system would have been of a more deleterious description, than if first secreted, and then absorbed; and this fact we know to be particularly true with regard to the urine, as the suppression of that secretion is always much more dangerous than when, on account of retention, it is absorbed. In the yellow cases occurring in the epidemic, there were good reasons for believing that the blood was very highly venous; that it was in an unusual manner loaded with those constituents which go to form the bile; it is also a very tenable supposition that the organic influence proper to this organ was affected, which might importantly disorder the function of the organ, and render its secretion of a perverted nature, as we are well aware that the nervous system sometimes acts very powerfully on the liver, even when a person is in a state of positive health, and it is highly probable that it is capable of acting much more so when the system is labouring under any morbid impression; sudden emotions of the mind, as violent fits of passion, excessive joy, an attack of hemiplegia, etc., have been followed by

jaundice,* at once proving the influence of the nervous system over the natural actions of the organ. Again, the bites of poisonous animals, as also surgical operations, and severe wounds, have been occasionally succeeded by jaundice, proving the effects of the same; hence, from these facts, it seems a rational inference, that some obscure perversion in the organic nervous influence proper to this organ, being proximately produced by certain inherent conditions in the poison giving rise to the fever, by the operation of which it was highly stimulated to excessive functional action, together with the state of the blood above mentioned, might in some measure, if not very importantly, account for the conditions now treated of. In recapitulation, then, it may be said, relative to this particular part of the inquiry—First, that the blood was highly venous, and contained an anormal quantity of those matters which go to form the bile. Secondly, that the nervous organic influence proper to the liver, being affected by certain unknown properties in the poison producing the fever, by which its functional action was morbidly increased; thus the former and latter causes giving rise to great engorgement of the viscus. Thirdly, an inordinate quantity of bile being secreted it was carried in an anormal degree to the duodenum, from whence by the powerful efforts to vomit it was poured over the internal surface of the stomach, and the fæces being greatly impregnated with it, the secretion was thus in a morbid manner brought in contact with the whole surface of the digestive canal, from which (as well as from the liver itself, seeing that it was so engorged and acting with an increase of functional power) the absorbents would carry it into the current of the circulation, and thus every tissue of the body would become discoloured. Fourthly, it may also be presumed, that the venous blood, by possessing such a very great proportion of those constituents which constitute the bile, and the liver being morbidly surcharged with this viscid secretion, that its secretory powers were unequal to the task of efficiently separating the bilious matter from the venous fluid, and thus another cause be superadded to those above enumerated in the induction of the appearance now considered.

III. *It may lastly be inquired as to the manner in which death was caused in the severer forms of the yellow eases.*—It has been stated above that the jaundiced cases gave indubitable evidence of a redundancy of bile; and it is also said that more or less suppression of urine was an accompaniment to other symptoms manifested in the worst of these cases. Thus, then, it may easily be imagined what effect would be produced in the system by an undue quantity of the active principles of these two secretions (cholesterine and urea) circulating in the blood, and thus acting upon the vital organs; and from an attentive observation of many cases of this kind which came under my notice, the brain and spinal marrow seemed to be less affected, when the bowels were slightly acted upon, and strong

* Chapman, Valsalva, Lauzoni, Baillie, etc.

diuretics administered, thus carrying off these secretions, which, if not promptly removed from the system, appeared to exert their pernicious influence. I do not, however, mean to affirm that death was altogether caused by the agency of these deleterious principles; only they seemed to act an important part amid the train of the other febrile phenomena. In some of those patients who died with the yellow complication, towards the close symptoms very much like those produced by a narcotic poison were apparent; the surface became cold and clammy; the patient lay in a helpless manner on his back; the pulse was weak, the pupils contracted, and delirium and coma wound up the scene. Hence it is an unavoidable conclusion to be arrived at, that the great nervous centres laboured under some potent and depressing agency, in addition to the specific poison of the fever.

The case as annexed is illustrative of the complication now described:—

CASE VI.—*Severe yellow case, with head affection, and slight bronchial complication.*

Alexander Gordon, æt. thirty-six, single; a labourer, of full stature, and well proportioned. Features strongly marked; eyes deeply set in their foramina; hair black; temperament bilious; thorax broad and deep; is muscular and powerful-looking. Admitted December 15th.

States:—Has been of intemperate habits; had generally enjoyed robust health. On the 12th was suddenly seized with rigors, which were succeeded by nausea, etc., ushering in a fever of the epidemic description. On admission complains of pains in the limbs, with general lassitude and languor; some abdominal tenderness, especially over epigastric region; chief symptoms appear located in head, which is hot and burning; pulse rather high; skin feels hot, and imparts a tingling sensation to the tips of the fingers; eyes preternaturally brilliant; bowels previously resolved by aperients of the saline order; has passed urine in moderate quantity; complains of thirst, but has no appetite for food; some tendency to yellowness generally.

Hab. statim Hyd. Chlorid. gr. v.; Pulv. Antimonialis, gr. iij. R Potassæ Nitratis ʒj.; Liq. Ammon. Acet. ʒij.; Sp. Æth. Nit. ʒvj.; Pulv. Ipecac. gr. x.; Mist. Camph. ʒv. Sit Mist. cujus unciam capiat 4ta q. q. horâ.

Vespere.—Head symptoms in no degree relieved, but rather increased in intensity; great heat of scalp; bowels opened freely; urine passed naturally; skin as in the morning; head is rolled from side to side upon the pillow, as if in great pain.

Adradatur cap. Hirudines viii. temporibus applicentur. R Mur. Morph. gr. ss.; Hyd. Chlor. gr. j. Sit pulvis horâ somni sumendus.

Dec. 16th.—Head symptoms apparently relieved; slept soundly

during the night; some tendency to diaphoresis; bowels moved, and urine passed normally.

Noon.—Tongue, from remaining glazed and dry, is assuming a darker hue. From an early hour this morning has been complaining of cough, and now expectorates a glairy frothy mucus, streaked with a bloody-looking discharge; the symptoms are referrible to a slight bronchial attack under which he manifestly labours.

Emp. Lyttæ pectori statim applicand. R Mucil. Acaciæ ʒviij.; Vin. Ipecac. ʒj.; Sol. Mur. Morph. ʒij. Sit Mist. Cap. cochl. amp. duo 4ta q. q. horâ.

Vespere.—Experiences great relief.

Habeat horâ somni Pulv. Ipecac. C. gr. xij.

Dec. 17th, morning.—Countenance assuming a leaden hue; hepatic region not more tender than usual; urine passed freely; head much as it was yesterday; bowels open.

R Calomelanos gr. vj.; Pulvis Antimonialis, gr. iij. Sit pulvis statim sumendus.

2 o'clock, P.M.—Is becoming rapidly worse; skin generally presents a mahogany tint; there is excessive prostration of strength; singultus; pulse small and compressible; surface clammy to the touch; intellect, though slightly obscured, is not much impaired, coherent answers being returned upon interrogation; feet warm; eyes sunk; pupils directed considerably inwards, which gives a strabismoid expression to the countenance.

Habeat. statim Vin. Rub. ʒj.; Sp. Communis ʒss., et rep. omni horâ.

R Sp. Æth. Nit. ʒvj.; Potassæ Nitratis ʒij.; Aquæ ʒviij. Sit Mist., cujus cap. ʒj. 4ta q. q. horâ. Sinapismus abdom. applicand.

5 o'clock, P.M.—Has rallied somewhat under the treatment; urine passed freely, and of high colour; bowels open; pulse more full and regular; can articulate better than he did. Tongue thickly coated with a deep brown fur, but moist at apex and edges; skin feels clammy, but warm.

Medicamenta Vin. Rub., et. Sp. Cont. Enema Tereb. injec.

10 o'clock, P.M.—Continues a little better; hiccup less distressing, and has perceptibly been relieved since the administration of wine and spirits.

Dec. 18th, morning.—Has rallied and relapsed alternately during the night; bowels open; passed a tolerable quantity of urine. On the whole no material difference in symptoms from those described last night. The dejections in every respect appear natural.

Medicament. et Vin. Rub. et. Sp. cont.

Vespere.—Tongue covered with a brown fur, but moist. There is little or no delirium, yet a tendency to stupor is manifest. The skin yet maintains its yellow, mahogany-looking colour; cough not so troublesome; pulse neither rapid nor weak, but varies much

between visits according to the quantity of stimulants given; urine passed freely, and in good quantity: hiccup the same.

Vinum et Spiritus cont. Enema Terebinth. inject. R Nitratis Potassæ ʒj.; Sp. Æth. Nit. ʒj.; Tr. Hyoscyami ʒj.; Aquæ ʒij. Sit haustus cujus dimid. cap. statim, et alt. part. post horas duas.

Dec. 19th, mane.—Is a little more delirious this morning; pulse 85, soft and full; tongue cleaner and moist; has no pain in any part of the body; no cough; bowels open; urine passed freely; skin a little more moist.

Vespere.—Pulse 85; some hiccup; bowels twice opened; urine passed plentifully; tongue moist, and more clean; delirium less; skin warm and moist.

Medicamenta Vin. et Spiritus cont.

Dec. 20th.—Has passed a restless night; reported to have been delirious at intervals; intellect somewhat obscure; skin not so yellow; countenance more natural; skin cool; pulse 100, rather small; no cough; no epigastric pain; bowels moved twice during the night; urine excreted of a dark, porter-like colour.

Omnia Medicamenta et Vin. Spiritus cont.

Dec. 21st.—Yellowness disappearing; seems quite collected; expresses himself as being free from all pain; countenance natural; bowels open; urine passed plentifully. Had enema terebinth last night, with relief to flatulency; pulse quick; skin moist and warm.

Vespere.—Somewhat feverish, with hot skin, and complains of thirst, headache, and restlessness. Pulse 100; bowels relieved only once during the day.

Omit wine and spirits for three hours. Enema foetida statim injiciatur.

Dec. 22nd.—Feels better: pulse 100; skin cool; complains of no pain; hiccup is still troublesome; bowels open; urine passed copiously; yellowness of surface disappearing.

Vin. et Sp. Cont. R Sp. Ammon. Co. ʒj.; Sp. Æth. Sulph. ʒjss.; Sp. Lavand. Co. ʒj.; Mist. Camp. ʒvj. Sit Mist., cujus cap. ʒj. 4ta q. q. horâ.

Dec. 23rd.—Tongue cleaner; yellowness more indistinct; bowels open; urine voided in good quantity; skin cool; pulse nearly natural; hiccough continues, but with less frequency.

Medicamenta, etc., cont.

Dec. 24th.—Slight hiccough still present; all other symptoms nearly gone.

Ordered steak diet.*

* Breakfast :—Bread, 6 oz. ; Coffee, $\frac{1}{2}$ pint.

Dinner :—Potatoes, 16 oz. ; beef-steak, 4 oz. ; broth, 1 pint.

Supper :—Bread, 6 oz. ; tea, $\frac{1}{2}$ pint.

Dec. 25th.—No pain whatever : tongue, which has been exceedingly coated, is more tender, as also the gums.

Habeat gargarisma c. Soda Subboratis.

26th.—Continues to improve.

27th.—No return of any morbid affection.

28th.—Progresses favourably.

29th.—No return pain, or any untoward symptom.

30th.—Expresses himself as speedily recovering.

31st.—Convalescent.

REMARKS.—It is an observation advanced by some authorities of eminence who have written on yellow fever of the West Indies, that a “firmness of fibre” predisposes to that disease; that strong muscular individuals are much more prone to its contraction, and have it in a much more malignant form, than those who are naturally of a relaxed habit. This man, as reported, was of a powerful, athletic conformation, and we see that he had the distemper very severely. On admission, it was evident, from the dusky yellowish hue of the skin, that he would go on to the jaundiced condition. On the day of admission the head was more than ordinarily complained of, and this affection continued for some days. On the fifth day of the disease alarming symptoms had set in; there was a dingy hue of the whole surface; the countenance looked sunken and congested; the pulse was small; delirium, etc., present; constituting a group of symptoms that were calculated to render the result very doubtful. The reader will see that large doses of the nitrate of potassa were given in order to keep the kidneys in action, and thus avert the evil consequences that might arise from the functional derangement of those organs, especially as there was some tendency to a suppression of the secretion. The singultus was unusually persistent, and I only remember one other instance in which it was so distressing and continued so long. By the seventh day we see there was slight improvement; and on the twelfth he was ordered steak-diet—circumstances very different to what we know with regard to typhus. The head symptoms were probably in some measure dependent upon urea and cholesterine. The stimulants that were thus freely given were undoubtedly of essential service in supporting the vital powers.

The subjoined case of Donaldson forms another good exemplification of the yellow affection.

CASE VII.—*Severe form of the yellow affection terminating fatally.*

James Donaldson, æt. fifty-five, a shoemaker, from Campbell's Close, High Street, admitted November 28th.

States:—Five days ago (November 23rd) had a rigor, which was succeeded by the usual initiatory symptoms of the epidemic.

On admission, complains of muscular and arthritic pains, tenderness at epigastrium, with nausea, and occasional vomiting, the

ejected matter forming a dark green, bilious-looking liquid. Skin generally is of a yellow tint, and tunica adnata of a similar hue; tongue covered (except at apex and edges) with a thick yellowish brown coat, but generally moist; urine high-coloured, and last stool reported to be dark. Skin feels hot and harsh to the touch; says he has slept badly for the last two or three nights; has a good deal of headache, which is referred chiefly to the frontal region; bowels confined; pulse 108, rather compressible.

Abradatur caputium. Habeat Infus. Cathart. ζ iv.

Vespere.—Symptoms a good deal the same as those in the description of his case at noon; bowels not moved, and head feels hot.

Cloths immersed in cold vinegar and water to be frequently applied to the head, and the cathartic infusion may be repeated if the bowels be not opened in two hours' time.

Nov. 29th.—Complains of a good deal of pain in the head; conjunctiva of a deep saffron yellow; skin generally of a bright lemon hue, being most distinct upon the neck, chest, superior extremities, and abdomen; on legs and feet not so intense as on other parts. From being a light yellowish tint, as reported yesterday, the previously described symptoms have supervened during last night. Bowels confined; pulse small.

Infus. Cathart. Rep. R Calomelanos gr. vj.; Pulv. Opii gr. iss; Conf. Rosæ gr. viij. Sint pilulæ duæ statim sumendæ.

Vespere.—Bowels opened three times; dejections dark and bilious; urine passed in tolerable quantity, and of a deep porter-colour; otherwise much the same.

November 30th, *Mane*.—Skin very yellow to-day, especially on neck, face, chest, and arms; great tenderness over the hypochondriac regions; tongue not so much loaded, but glossy and dry; pulse small and weak; breathing laborious and hurried; bowels open.

Pilulæ c. Calomel et Op. repetantur. Habeat Mistura Camph. ζ j. omni secunda hora.

Vespere.—Much the same as at noon; pulse slightly improved.

Mist. Camp. cont.

Dec. 1st.—Yellowness intense to-day; is laid on his back low down in the bed. Pupils contracted; breathing hurried and short; much pain over the hypochondriac and epigastric regions; slumbers a good deal; bowels open; fæces dark olive-coloured; urine of a porter-like appearance, and scanty; extremities cold and clammy; pulse 80, so weak and thready as to be almost imperceptible.

Hot bottles to be applied to the feet. Emp. Lyttæ hypochond. dext. statim applicetur. Enema Terebinth. quam prius inject.

R Sol. Mur. Morph. gtt. x.; Sp. Æth. Sulph. gtt. xx.; Aquæ Menth. Pip. ζ iss. Sit haustus statim capiendus. Habeat Sp. Com. ζ j. in aqua calida om. hora.

Vespere.—Symptoms generally assuming a more alarming character; tongue dry and glossy; pulse still so weak that it is with difficulty discovered at the wrist; pupils small and piercing. Is insensible, and slumbers constantly, except when for a moment roused, and then upon interrogation a partially coherent answer is returned.

Sp. Communis Cont. Haustus rep. Enema Terebinth. inject.

2nd.—Continued to sink, and died during the night.

Section Cadaveris fifty hours after death.

Head.—Brain.—Removing the calvarium, the cerebral vessels look gorged and turgid. Some febrile effusion beneath the arachnoid; convolutions extremely deep. In lateral ventricles 3j. of serous effusion, and 5v. more were discovered on removing the cerebrum in the base of the skull.

Chest.—Heart and lungs healthy.

Abdomen.—Liver weighs 5lbs. 10 oz.; is gorged with a dark, bloody, thick-looking fluid, which, on a section being made in the organ, is upon pressure easily expressed from the cut surfaces. Gall-bladder filled to distension with a thick, viscid, dark olive-coloured bile, being so tenacious that it might appropriately be termed ductile; and a portion can be raised, by means of a knife, in a continuous string to the height of three feet. The gall-ducts are perfectly pervious.

Kidneys remarkably yellow, and their pelvic lining is of a saffron hue, but present no other morbid characters.

Spleen weighs 12 oz., congested, soft, and easily broken between the fingers, but not diffuent.

Intestines slightly injected, but no traces of ulceration in the ilium or any other part.

REMARKS.—On the day of admission, being the fifth of the fever, from the general dinginess of the surface, it was quite evident that his case would be one of the yellow complication, and from the accompanying symptoms it was to be anticipated in a severe form. There was tenderness at the epigastrium, vomiting of a dark bilious matter, and discoloration of the conjunctivæ; the stools were dark, being highly saturated with bile, and the patient complained of a good deal of frontal headache. On the sixth day the yellowness had become greatly increased, and was observed of a deeper hue on those parts as before mentioned. According to the next report, being that of the seventh day, symptoms of a very formidable nature were manifest; the yellowness had now become intense, there was great tenderness at the hypochondria, dry tongue, quick and feeble pulse, with hurried respiration,—circumstances seriously indicating the precariousness of his condition. Early on the subsequent and last day the unwelcome preludes to dissolution were indubitably at hand. The helpless manner in which he lay in bed evinced a general

declension of muscular power; the contracted pupils and lethargic state showed the very probable effusion of serum into the various cavities of the brain; the dejections continued dark, and surcharged with bile; the natural temperature rapidly decreasing, and the pulse now had become so weak as to be almost imperceptible. These symptoms became gradually more alarming until death.

To the post-mortem appearances I would particularly beg the attention of the reader, as it is by first attentively surveying the operations of morbid actions, and then examining the physical conditions after death, that cause and effect can most satisfactorily be traced, and those fundamental truths arrived at by which our improvement in practice is likely to be acquired, although, as previously observed, the autopsies made in fever are less conclusive than in any other class of disease. The brain was turgid, and the blood-vessels unusually injected, and not less than 5xiii. of serous fluid had been exuded, well accounting for the cephalic symptoms prior to dissolution. The liver was considerably larger than the average weight, being much engorged and distended, by which may be explained the cause of the dull aching pain experienced in the right hypochondrium. The gall-bladder was unusually full, and its contents anormally viscid and tenacious, notwithstanding its natural outlets being in no manner obstructed. The pelvic lining of the kidneys even were stained with the yellow colour; and I well remember, when opening this body, that the cartilages of the false ribs of the sterno-clavicular articulation, etc., were similarly tinged. The congestion of the spleen might have been anticipated from the pain complained of in the left hypochondrium, and we saw that it was morbidly enlarged. When we consider that a diseased secretion like that which was poured out by the biliary apparatus was for some time brought into contact with the digestive surface, it is a very probable inference that more or less vascularity would be produced in the mucous membrane of the canal. Ulceration in the lower part of the ilium, and about the ileo-cæcal valve—the most common parts in which this morbid appearance is found in true typhoid—was scarcely, if at all, observed in the inspections of the relapsing fever; and from what I have heard and read respecting the yellow fever abroad, an ulcerative condition in these parts is very rarely witnessed in that disease.

Black vomit, although it very seldom occurred in the Edinburgh hospitals,—in fact, forming but an insignificant fraction when compared with the whole number,—yet as some unequivocal cases did occur, and as in other parts of the kingdom they were more frequently met with than in the metropolis, consequently this particular feature cannot with propriety in silence be passed over. In yellow fever epidemics abroad undisputed black vomit is the concomitant of the most malignant description of that disease, and, as before stated, from this symptom, in conjunction with that of yellowness, many form their diagnosis of that affection. The writers of ancient times,

the older authors, and modern physicians,* regard black vomit as a very alarming condition; † and certain it is, that when it has fairly commenced, a very small proportion of the patients recover. Vomiting of dark-coloured matters has sometimes been noticed during febrile attacks in this country, and certain physicians have then imagined that such fever was a modification of the real yellow fever, and that their only difference was in the degree of their malignancy, and not in their radical pathology. ‡ This opinion, however, is quite discrepant to the notions of many respectable authorities. The few cases which I saw in Edinburgh all died, and these were patients in whom well-marked indications of jaundice were present. On referring to the accounts given by various writers who have recorded epidemic visitations of yellow fever, all agree in considering this a most fatal symptom, and, during an epidemic, out of many hundreds of cases, where the black vomit had supervened, scarcely any recovered, and such recoveries as did take place were a mere fraction when compared with the whole; perhaps one or two per cent., or even less than that number.

Respecting the nature of the ejected matters, and the real cause of the blackness, there are various opinions. The ejections which I saw in the relapsing fever were not so dark on the first appearance of this symptom as they were when it had continued for some time; then, reaching its greatest intensity of blackness, it again gradually became of a lighter colour. At the commencement the matters looked like simple bilious vomiting, of a dark greenish hue, from which they became of an inky blackness, and then of a brownish grey. Bone, when speaking of the yellow fever of the West Indies, says, that a flaky brown blood-colour usually precedes the inky-black. Without troubling the reader with an enumeration of the several theories that have been advanced respecting the consideration in question, the following conclusions are perhaps the most correct inferences in accounting for the morbid product alluded to:—viz., the villous coat of the stomach being in a state of partial disorganization, rupture of the arterial capillaries takes place, and the blood is thus exuded into the cavity of the stomach, and mixed with the contents of that organ; the gastric secretion being morbidly increased, and possessing perhaps an undue degree of acid properties, a chemical action ensues, by which the contained fluid becomes inspissated, and acquires a dark colour of various degrees of intensity; this, of course, being determined according to the proportional admixture of bile, of exuded blood, and the power of the secreted acid. The kind and quantity of liquids drunk, as well as other descriptions of ingesta taken, by diluting and acting upon the morbid products contained in the organ, exert their due influence, and

* Hippocrates, Thucydides, Celsus, Galen, Sydenham, Fordyce, Bancroft, Jackson, Carstell, Rush, etc.

† Blane considers it a positively hopeless symptom.

‡ Stokes, Graves, etc.

modify the characteristics of the vomited matters. When this affection is present there is always more or less vitiation of the bilious secretion, and, indeed, some have asserted that the black ejections are nothing more than this diseased secretion. The bile now being preternaturally viscid, its incorporation with an acid produces a gelatinous sediment, and the tenacity of this sediment varies according to the viscid nature of the bile, and the strength of the acid; Huxham and Baglivi long ago demonstrated this fact. That blood is thrown out in the manner described above, has been proved by ocular demonstration. In one or two instances which I saw there were various ecchymosed patches on the villous coat of the stomach, and in the organ was discovered an inky-looking fluid similar to that vomited by the patient before death. In the instance of Peter Reid, now given, is afforded a good illustration of this complication.

CASE VIII.*—*An example of "black-vomit," the case terminating fatally.*

Peter Reid, æt. thirty-five, a labourer, single, hair dark, eyes deeply set, features strongly marked, chest broad and capacious, stout and muscular. Admitted December 28th (to the medical wards).

This patient first entered the surgical hospital for an injury done to one of the fingers. Immediately on admission, symptoms of the prevailing epidemic became manifest, and he was quickly sent to the medical department of the institution. On the 24th, the day of his entrance into the surgical wards, a slight tinge of yellowness was observed in the skin and conjunctivæ.

Dec. 28th, *Vespere*.—States that he had much vomiting last night of a dark grumous fluid; yellowness of surface now very evident, as also of eyes. Some pain and tenderness on pressure over the hypochondriac and epigastric regions; on taking a full inspiration, thorax perfectly expands, and no uneasiness is experienced. Pupils slightly contracted; bowels confined; tongue moist, but loaded with a dirty whitish-yellow coat. Pulse of natural frequency and good strength; had vomiting to the extent of two or three quarts since admission this afternoon, ejection being of a dark-looking colour, and about the consistence of hare soup. On allowing the vomited matter to stand and settle, a black coffee-grounds like sediment is deposited.

* Being unavoidably absent from the pathological theatre during the day in which this body was examined, and as no particular details were taken of the autopsy, I regret that I cannot present the reader with a more than general statement of the inspection. The late Professor Graham, who was present, informed me that there was a morbid quantity of serous exudation in the cavities of the brain, that the liver and spleen were engorged, and in the stomach was discovered some grumous black matter precisely resembling that which had previously been ejected; also that the villous coat of this organ presented some ecchymosed looking patches, which left no doubt as to the exudation of blood.

Enema purgans statim injiciatur. Postea habeat pulv. cum Hyd. Chlor. gr. vi. Pulv. Rhei. gr. x. Sinapismus epigastrio applicand.

Dec. 29th, at visit, noon.—Reported to have vomited a large quantity of inky-looking fluid, about the consistency of coffee-grounds. Skin of moderate temperature; bowels opened, and tenderness over the epigastrium much the same. Slept but little last night; pupils still small; intellect pretty natural; urine passed in tolerable quantity; complains of a good deal of thirst. Pulse of tolerable strength, and moderate frequency.

Enema Amyli c. Sol. Mur. Morph. gtt. xl. statim injiciatur. Bibat decoct. avenæ.

Vespere.—Sickness not so violent since administration of injection, yet still has had vomiting to the extent of a quart of the same description as the last. Complains of no pain, except over hypochondriac and epigastric regions; skin hot; much thirst; pulse a little quicker.

30th, noon.—Slept but little during the night; had vomiting to the quantity of three pints, the matter not quite so dark as hitherto. Pupils small and contracted; complains of pain in the head; bowels open; surface rather cool and clammy; pulse smaller than it has been; urine passed in tolerable quantity. Yellowness not so intense.

Habeat Sp. Communis ʒiv. Cap. ʒj. in aqua calid. et saccharo, 4ta quaque horâ.

R Sol. Mur. Morph. ʒij.; Sp. Æth. Nit. ʒss.; Sp. Ammon. Co. ʒij.; Mist. Camph. ʒvij. Sit Mist. Cap. ʒj. omni tria. horâ. Abradatur capalitium.

Vespere.—Much the same as at visit; vomiting not so severe.

Enema c. Sol. Mur. Morph. repetatur.

31st.—Did not sleep much during the night, though he slumbered at short intervals; was delirious; vomiting not so persistent, and the ejected matter was less in quantity and of a more natural colour. This morning seems somewhat unconscious, and answers questions confusedly. Skin feels cold and clammy; bowels open; urine voided in tolerable quantity; much thirst; tongue coated and dry. Pulse 96, small and weak.

Sp. Com. et Mist. Contr. Emp. Lyttæ vertici applicand.

R Calomelanos gr. vi.; Sacch. Alb. gr. x. Sit pulvis s. s.

Vespere.—Seems much worse this evening; is now quite insensible, and has slumbered a good deal during the afternoon. Surface not so warm as natural; lower extremities becoming cold; tongue dry; pupils small; pulse quicker and more compressible.

Bottles of hot water to be applied to the feet.

R Sp. Æth. Rect. gt. xxx.; Sp. Lavand. Co. gt. xxx.; Mist. Camph. ʒij. Sit haustus, s. s. Sp. Communis ʒj. in aqua calida omni horâ.

Jan. 1st, 1844.—Extremities became colder; surface chilly; had

slight muttering delirium, and continued to get rapidly worse until eight o'clock this morning, when he expired.

REMARKS.—On a perusal of this man's case it is seen, that with the accession of vomiting were ushered in the most unfavourable symptoms. On the fourth day the ejections were dark and grumous, and on the next they had become of an inky blackness. On the sixth the vomiting still continued, but the matters ejected were of a somewhat lighter colour; there were now the unwelcome symptoms of cephalic affection, while the natural temperature was becoming below its standard; in the evening of this day the vomiting had in some degree declined, but with no mitigation of the other grave symptoms. On the seventh day, delirium, feeble pulse, cold surface, etc., proclaimed too obviously that dissolution was at hand, and he sank early on the following morning. I well remember that this individual, from the first of his admission into the medical wards, was troubled with an unusually urgent thirst, though the pulse was low, the tongue pretty moist, and the surface cool.

VIII.—*There was almost universally a recurrence of the primary symptoms during the patient's convalescence, and such relapse sometimes took place to the third or even fourth time.*

Real relapses in typhus, some physicians confidently assert, no more take place than they do in the exanthemata. By relapse it must be understood is meant a positive repetition of the primary symptoms of the disease in a patient who is convalescent from fever, having just passed through the febrile state, the affection spontaneously recurring and again passing through the various phenomena of the febrile paroxysm. Other authorities, and those who have paid very great attention to the study of typhus, aver that relapses, though exceedingly rare, do sometimes occur. Dr. Perry, of Glasgow, who writes respecting the epidemic of that city in 1831, says, that "out of 1,145 cases there were 19 relapses, averaging 1 in 60." Dr. Henderson, from a careful record of 2,000 patients, confidently affirms that "cases in typhus no more relapse than do those of measles and small-pox." I am fully aware that a patient in typhus may, after the critical period has passed, suddenly become worse; the pulse may rise, the skin become hotter, etc., denoting an aggravation of existent symptoms, but then such can generally be traced to an obvious cause, which when discovered readily explains that which otherwise might seem mysterious, and be attributed to the *prima causa* nature of the disease, instead, as it should have been, to an adventitious circumstance. Errors in diet, a variable temperature, some moral calamity causing great mental disquietude, or any similar excitant applied either to the mind or body, would be fully calculated to produce an aggravated state of the disease, but not a repetition of it. An inflammatory condition of some vital organ may supervene during convalescence, which would most likely be attended with a considerable addition of constitutional disturbance; there

would, of course, be an accompaniment of symptomatic fever proportionate to the degree of local inflammation, yet this, however difficult it might be to discriminate between the two febrile types, viz., the idiopathic and symptomatic forms, would be a phenomenon referrible to a topical cause, and not a relapse according to the general acceptance of that term. In my own humble opinion there are cogent reasons for believing that genuine typhus does not relapse, especially cases of eruptive typhus, which is the most unequivocal of all forms of that disease, and there is little doubt that those aggravated states, commonly termed relapses, are nothing more than conditions attributable to the above mentioned causes.

In relapsing fever, however, there were positive and negative facts demonstratively showing that indisputable relapses did take place, and the febrile paroxysms were repeated often to the second or third, occasionally to the fourth, and in some rare instances even to the fifth time, and these occurring without any exciting cause being applied. There was an alternation of febrile and non-febrile states, constituting from one to five distinct febrile paroxysms, and the last pyrexial attack seemed as veritably to proceed *ex primis causis* as the first ; because the train of phenomena characterising the succeeding pyrexial states differed not in the essential particulars, because no precautions seemed to have any influence in preventing their return, because those returns observed a regular periodicity, viewing them to be the natural and spontaneous operations of the disease, and because they continued with unimportant variation from the commencement to the close of the epidemic visitation. From an attentive observation of the fever, from the beginning to its entire termination, the first febrile period was the most regular as well as the longest in its duration. The succeeding attacks were not so protracted, but with regard to the degree of intensity there was little difference between them. The febrile paroxysm succeeding the first intermission varied from a few hours to a few days ; for the most part, however, it would continue from forty to fifty hours, when a powerful sweat resolved the fever as quickly and effectually as it had done the first attack. An intermission again was manifest, which, with rigors, hot skin, quick pulse, etc., foretold the accession of another relapse. This disposition to alternately recur and subside showed that the fever possessed peculiarities somewhat resembling the true intermittent type. Again, it will be seen by the tabular forms from time to time given, that the relapses were most frequent during the autumnal months, a period particularly associated with and accounted as favourable to the development of the intermittent fever, although, as above stated, the patients relapsed to the very termination of the epidemic. Some of the hospital physicians at the first attributed those returns to dietetic causes, and consequently observed the most scrupulous precautions, but apparently without the least effect, as they relapsed, it not mattering whatever diet they were ordered. Several patients under my

own care continued the low diet longer than usual, with a view to the prevention of a return, but this, and similar plans, I was induced to abandon, from a conviction that such were quite ineffectual.

According to Dr. Christison and others, the fever of 1817—20 very commonly relapsed, and the average mentioned was one to five of the whole number, as deduced from the reports of the hospitals. My own statistics give the exact proportions taken at various times as follows:—In Table No. IV. (Sept. 1843), out of 330 cases 167, being 1 in 1·97, had one relapse; 29, or 1 in 11·38, had two relapses; 5, or 1 in 66, had three, and 1 had four relapses, giving in the aggregate 202 out of 330 that had one or more relapses. In Table No. V. (Oct. 1843), 72 out of 80 patients, being 1 in 1·11, relapsed one or more times. In Table No. VI. (Jan. 1844), out of 450 cases, 231, or 1 in 1·95, had one relapse, being about 10 out of every 19½; 14, or 1 in 32·14, two relapses; 2, or 1 in 225, three relapses; hence in the aggregate of this number 247, being 1 in 1·82, or about four out of nine, relapsed. In Table No. VII. (from Nov. 1843 to Jan. 1844), 38 out of the 40 cases there reported relapsed, being 1 in 1·006. In Table No. VIII. (April 1844), out of 80 patients, 40 had one relapse, being 1 in 2, and 4 had two relapses, being 1 in 20. From the above 980 cases, the following are the results:—viz., 603 had one or more relapses, being 1 in 1·62; 67, being 1 in 14·6, two relapses; 9 had three, being 1 in 108·88, and one patient had four relapses. There were one or two other instances in which the patients had five separate and distinct attacks. From a general view of the foregoing facts it is proved that not less than two-thirds relapsed before leaving the hospitals; and when we consider that many might have a return after their discharge, it would be no exaggeration to state confidently that three-fourths relapsed; some physicians at the time felt assured that those returns were of universal occurrence, if only the patient's malady could have been seen and watched from the very commencement until the disease had wholly subsided.

TABLE VIII.*

Males 35=1 in 2·28.

Females 45=1 in 1·77.

Residences:—

Canongate	8=1 in 10·
Cowgate	7=1 in 11·42
Grassmarket	2=1 in 40·
High Street	12=1 in 6·66
Closes	13=1 in 6·153
Wynds	10=1 in 8·
Westport	4=1 in 20·
From other places	25=1 in 3·2

* Compiled in April 1844.

Mode of attack :—

Rigors . . . . .	.65=1 in	1.23
Nausea or vomiting . . . . .	.56=1 in	1.42
Arthritic pains, or muscular pains . . . . .	.52=1 in	1.53

Predominating symptoms :—

Head . . . . .	.54=1 in	1.5
Chest . . . . .	.10=1 in	8.

Abdomen :—

Left hypochondrium . . . . .	.22=1 in	3.636
Right hypochondrium . . . . .	.12=1 in	6.66
Epigastrium . . . . .	.22=1 in	3.636
Delirium . . . . .	.7=1 in	11.42
Cough . . . . .	.18=1 in	4.44

Assigned cause :—

Wet and cold . . . . .	.22=1 in	3.636
Contagion . . . . .	.31=1 in	2.68
None . . . . .	.28=1 in	2.85

Abstraction of blood :—

General . . . . .	.4=1 in	20.
Local { Head . . . . .	.14=1 in	5.71
{ Chest . . . . .	.7=1 in	11.42
{ Abdomen . . . . .	.7=1 in	11.47

<i>Yellow cases</i>2=1 in	40.
-------------------------------	---------	-----

Relapses :—

First . . . . .	.40=1 in	22.
Second . . . . .	.4=1 in	20.
Third		"
Fourth		"

<i>Muscular or arthritic pains during convalescence</i>	.40=1 in	2.
---	----------	----

<i>Dysenteric affections</i>5=1 in	16.
--	---------	-----

Stimulants :—

Wine . . . . .	.10=1 in	8.
Spirits . . . . .	.8=1 in	10.
Ale or porter . . . . .	.10=1 in	8.

It was the opinion of the renowned Sydenham, that as much attention should be paid as possible to the prevailing nature of an epidemic, in order that we may gain an accurate knowledge of its peculiarities, and thus be enabled to bring an efficient treatment to bear upon the disease. Respecting the attack now treated of this doctrine is fully applicable, for having become sufficiently satisfied that the relapses were the spontaneous operations of the disease, there was less cause to fear, than if those periodical aggravations had been considered as more of a local character. Respecting what has been advanced above relative to the non-relapsing nature of real typhus, this opinion merits the serious consideration of the practitioner, because important results might proceed from the one or other way of thinking. Those who are disposed to conclude that relapses do occur in typhus will render themselves liable to the mistaking acute visceral inflammation for what they considered a

mere relapse, and instead of the superadded affection being energetically combated, the insidious complication might be allowed to go on without much alarm to a fatal termination, when inspection would at once demonstrate the cause of that which had appeared unexpected.

IX.—*The pulse might be extremely high, without causing any alarm as to the result of the case.*

The state of the pulse in fever is one of the most important considerations relative to this form of disease, and a very high pulse in typhus is mostly associated with other unwelcome symptoms. If its frequency should be great at the commencement of the attack, we may expect the case to become one of alarming character, as it always becomes more frequent as the disease progresses. In the relapsing fever facts very different were manifest, and a pulse which would have been, and justly, dreaded in typhus, caused little concern in the epidemic, constituting another peculiar feature in the history of this distemper. In typhus a pulse of 150 would lead us to the conclusion that the case was one fraught with much danger, and the accompanying physical signs would corroborate such an opinion. In the epidemic the degree of frequency had reached its maximum often by the fourth or fifth, but seldom later than the seventh day, while in typhus it is generally double that period before such takes place. At the commencement of typhus the pulse is often about 90 per minute; an average deduced from eighty patients in the relapsing fever gave the mean frequency on admission as 98.1, and every succeeding day, until the crisis, it would increase in a ratio far exceeding that usually observed in the form of continued fever now mentioned. In some few instances it was so high as 170 or 180, and the patient recovered in the most satisfactory manner, nor was there any proportionate relation between the degree of severity of the other symptoms, and this unusual frequency, which, reasoning from my former experience in the phenomena of continued fever, one might have been led to expect. The sudden reduction of the pulse in the distemper now treated of, was quite unprecedented, and more resembled that which takes place in a pure intermittent than in a fever of the continued form, a few hours often producing as great a change as an equal number of days generally effect in typhus. This fact was noted at an early period of the epidemic, and all those physicians who were brought to the bedsides of their patients had their attention directed to this unusual phenomenon. Three or four hours, or half that time, would suffice for its reduction from being extremely high to its natural standard, and with this sudden change in the heart's action the other febrile symptoms would rapidly decline, so that in an incredible period the patient would become in a positive apyrexial state. In typhus the pulse gradually becomes slower and of better strength, and it generally requires many days to restore it to its

natural standard. If an equal number of epidemic and typhoid cases were selected, in each where the pulse was very high, the proportionate mortality of the latter would be immensely greater than the former. In confirmation of this assertion I will here quote from Dr. Henderson. "Among the cases of the epidemic fever of which I have preserved daily reports, and which ended on the fifth or the seventh day, amounting to fifty, I find nine in which the pulse exceeded 135, and of these *one* died; and among sixty-eight cases of typhus fever, not selected, of course, I find thirteen in which the pulse exceeded 134, and of these *five* died, giving a proportion in the one set of cases of a mortality, in connection with an extreme frequency of the pulse, of about 11 per cent., in the other of about 38 per cent." On a second comment on those data, he also says: "If we add four cases in which the pulse in the second paroxysm of the epidemic fever exceeded 135, to the nine previously noticed, we have a mortality in this disease connected with an extreme frequency of the pulse of 1 in 13, or less than 8 per cent." From what has now been said respecting the pulse in this disorder, it is quite manifest that the two descriptions of fever were dissimilar to one of the most essential diagnostic characteristics, there being no symptom upon which we place so much reliance as the heart's action. The subjoined case may here be quoted:—

CASE IX.—*Crisis seventh day.—Relapse fourteenth.—High pulse, falls to the natural standard on the supervention of diaphoresis, which a second time resolves the disease.*

James Wilkie, æt. twenty-four, single, complexion light, eyes blue, hair auburn, a stout muscular-looking man, and has been employed as a farm servant. Admitted July 28th, labouring under an attack of the epidemic, which had been ushered in by the usual initiatory symptoms. States that his present indisposition commenced four days ago (24th), by a fit of shivering.

On admission says that he did not sleep well last night. Countenance is rather flushed, has some tenderness over the hypochondriac and epigastric regions; skin hot and dry; breathing accelerated, but performed without pain; tongue moist, and is covered (except at the tip and edges), with a thick brownish yellow coat; bowels open; pulse 130, of good strength; urine passed in moderate quantity, which is high coloured.

Habeat statim Infus. Cathart. ʒiv.; Mist. Salin. Diaph. ʒviij.; cujus ʒj. cap. 4ta q. q. horâ.

Cold cloths to be applied to the head, which is hot and feverish. To be sponged with tepid water. Ordered low diet.

July 30th.—Slept better last night, but is still much the same as yesterday. Pulse 128.

Medicamenta contr.

31st.—Sweated copiously this morning (7th day); pulse 80, of

tolerable strength; slept pretty soundly since the sweat; is free from pain, and feels comfortable.

Mistura repetatur.

Aug. 1st. —Much the same as yesterday; skin moist; bowels open; urine passed copiously; complains of a slight pain in the chest, and has a little cough.

Habeat Linct. Opiat. Horâ somni capiendus Haust. c. Sol. Mur. Morph. gtt. xxx. in Aqua ʒiiss.

2nd.—Cough not so troublesome, and says that he feels better. The case progressed in the most favourable manner until

6th.—Had a fit of shivering this morning; much headache; skin hot and dry; tongue dry in centre; has a good deal of thirst; looks flushed in the face; is restless and uneasy; bowels not moved; urine high coloured and scanty; pulse risen to 120, of tolerable strength.

Hirudines viii. temporibus app. Mist. Salin. Diaph. Rep. Abradatur capatium. Horâ somni Haust. c. Sol. Mur. Morph. gtt. xxx. sumendus.

7th.—Had a tolerably quiet night, but did not sleep much; tongue dry; bowels open; urine voided nearly in normal quantity; head relieved by leeches; no cough, nor any pain in chest upon deep inspiration; pulse 120, rather weak and compressible.

Medicamenta Rep. Habeat Vin. Rub. ʒvi. in die. Cloths immersed in cold water to be applied to the head, which, though much easier, is still hot to the touch.

8th.—Much about the same as yesterday.

Med. et Vin. Cont.

8th, *Mane*.—Skin dry and burning to the fingers; countenance flushed; tosses about in bed, and feels very restless; had slight epistaxis this morning; head rather easier; tongue dry; bowels open; excretions pretty natural in appearance; urine passed in somewhat insufficient quantity; pulse 150, small, and not of very good strength.

Visit at noon.—Has had a very copious sweat, and pulse is down to 72, which is of pretty good volume, and of better strength. All sense of uneasiness gone; feels quite composed, and expresses himself as much relieved within the last two hours.

Mist. et Vinum Rep. Haust. Sedativ. ut ante h. s. sumendus.

10th.—Continues free from pain; slept well; bowels open; pulse nearly natural; tongue cleaner, and generally moist.

11th.—Slept well; complains of some arthritic pains, especially in the right elbow and knees; in other respects progresses favourably.

Linimentum Saponis Co. ʒj. parti aff. app. bis terve die. Vinum cont. Ordered common diet.

12th.—Continues to improve; rheumatic pains said to have been relieved by liniment; excretions voided normally.

Vinum Cont. Haustus Morph. ut ante h. s. s.

13th.—Progresses favourably.

To have steak diet. Vinum, ȝij . tantum in die. Bibat Cerevisia, Oj. in die.

15th.—Goes on well.

16th.—Improves.

Vinum omittatur.

17th.—Improves.

26th.—Dismissed as cured.

REMARKS.—On examining the details of this individual's illness an example is given illustrative of what has been asserted above. On the morning of the seventh day, during the first attack, the pulse had become reduced to 80, after a powerful sweat, although on the previous day it was so high as 128. The critical sweat was succeeded by a tranquil sleep of some hours' duration, after which he was free from pain, and in every respect favourable; the secretions becoming more regular, and every indication of a speedy convalescence being manifest. Five days subsequent to this crisis the relapse set in, which, as usual, was characterised by a close repetition of the primary symptoms. The skin became hot, with other indications of the febrile state, and in the course of two or three days the pulse had risen to 150 per minute, accompanied with much general disturbance. I remember the particulars of this man's case perfectly, and also the surprise which I then felt on seeing such a very sudden transition from one condition to another. On going round the wards to see the patients in those beds belonging to the physician to whom I was attached, the nurse directed my attention to Wilkie, who then seemed very restless, and complained of some pain over the os frontis; the head felt hot, and a cold application was ordered to be applied, which gave him some relief. I saw him again when the physician made his visit, which was not more than an hour and a half afterwards. He was now literally bathed in perspiration, the skin had become cool, he felt as mentioned in the report "quite composed;" the pulse, from being 150, small, and rather weak, was now reduced to its natural standard, of decidedly better volume, and of somewhat improved strength. His state was non-febrile. Thus, a space of less than two hours produced a veritable change, almost as great as that which we observe in typhus in a couple of weeks. What might have been anticipated as the result in typhus, with a pulse 150, and so copious a sweat? Certainly not the favourable condition which ensued in the instance of this man, but rather that spoken of in the case of Mrs. S. before given; viz., a mortal termination. From this time Wilkie progressed as well as could be desired, and was dismissed the hospital a fortnight from the last crisis. Many other cases, exemplifying the same peculiarity, came under my notice, but, as a repetition of examples would only be useless, I shall confine myself as much as possible to a brief illustration of points at issue.

X.—*The tongue was generally covered (except at apex and edges) with a thick, pasty, dirtyish, yellow-white-looking coat, mostly moist, at least, seldom so dry as we frequently observe it in genuine typhus.*

The state of the tongue in febrile diseases has always been regarded with the greatest attention; nor is there any symptom, with the exception of the pulse, upon which we place more reliance. It affords correct information respecting the secretions and the degree of disorder induced in the system by excessive circulatory action,—considerations of paramount importance in guiding our treatment of this class of disease. In the relapsing fever, it presented an appearance very different from that usually noticed in typhus and the other forms of continued fever common to this country. Indeed, so striking was this particular feature of the distemper, that all who saw much of the epidemic concurred in considering its condition as one of the many peculiarities which gave a distinctive character to the affection. In typhus, the tongue at an early period assumes a brownish hue, feels dry and roughish to the touch, becoming darker and more parched as the disease progresses; there is a want of natural moisture in the adjacent parts, and the teeth often become covered with sordes. In the epidemic, the mouth was unusually moist, and the tongue well-nigh always loaded with the fur as described above: the latter indicating that the gastro-mucous membrane was much affected. This coat was the thickest, and also of a darker hue, sometimes being of a brownish yellow towards the posterior part, and two or three deep irregular longitudinal fissures were frequently present. The tip and edges, as stated, were for the most part clean, often preternaturally so, exhibiting a rose-red or crimson tint, in this particular in some measure agreeing with the accounts given by Jackson, Thompson, Gillkrest, and others, who have recorded the yellow fever. In the jaundiced cases, as may be anticipated, the fur was of a far deeper yellow. During the two or three days preceding the crisis it would become dry; but as soon as the critical sweat supervened, it quickly became moist, and the thick pasty coat rapidly disappeared. On the setting in of the relapse, the fur was readily again present, manifesting little, if any, dissimilarity to the appearance noticed in the first attack, until the crisis, as before, restored the organ to a more natural state.

XI.—*Pregnant women at all periods of gestation invariably aborted, or were prematurely delivered.*

So invariably did miscarriage and premature delivery take place, that throughout the whole duration of the epidemic,—a period extending over at least fourteen or fifteen months,—I never discovered even a solitary instance of the impregnated uterus not expelling its contents; and the statements of others, whose experience in the

fever was as ample, bore testimony to the same. In Glasgow, Paisley, Dundee, Aberdeen, and other of the large towns in Scotland, the same fact in those places equally obtained. The date of conception seemed to exert little, if any, influence in forming a prevention, abortions and premature deliveries, strictly so called, being equally common. No positive data being arrived at as to the true cause of this occurrence, any remarks now advanced can be but those of theory or conjecture. All causes which heighten the circulation tend to endanger the expulsion of the ovum, because a greater amount of blood being sent, and with an increase of propulsive power, to the uterine sinuses, extravasation is apt to take place between the uterus and placenta, which has the effect of disuniting the latter from the former, and thus the embryo and its involucre acting as a foreign body, induce contraction of the parietes, and their consequent expulsion. The increased action of the heart in fever, and especially in the distemper now treated of, in which the circulation was so unusually high, would, from what has been said, undoubtedly tend to produce the result described; yet, when we consider that a healthy ovum powerfully adheres to the uterine walls, and is not easily displaced; that the peculiarity mentioned was universal, not merely occasional, in its occurrence; and that, from conclusions subsequently to be deduced, it rather seemed owing to some common cause than incidental circumstances,—it would be difficult, then, to ascribe the cause of expulsion solely to an increased action in the circulating system. Pursuing this question, it may be said, that the proximate causes of premature expulsion of the uterine contents are divisible into three classes: 1st, those which affect the uterus alone; 2nd, when there is disease of the foetal appendages; 3rd, the cause may be entirely restricted to the embryo or foetus itself.

1. A morbid condition in the great nervous centres will produce spasmodic action and contractile power in the uterine parietes, and such may be sufficient to cause the organ to expel its contents. Ergot of rye has its physiological action by affecting the cerebro-spinal system, and thus conveying its effects to the uterus, which is then excited to contractile efforts. It is not wholly improbable to suppose that the specific poison of a fever might produce some occult effect upon the brain and spinal marrow so as to be followed by results somewhat analogous to the agent mentioned, viz., to excite contractile action in the organ in question. In fever, the cerebro-spinal system forms the primary seat of disorder; and those morbid changes which take place in the circulation, and the phenomena consequent upon such alterations, are referrible to a perverted condition of nervous power; hence it may readily be conceived that such an amount of abnormal action might be induced as to produce the result considered.

2. Diseases of the foetal appendages sometimes produce abortion or premature delivery; but, as these are only occasional occurrences, and generally the results of gradual organic change, or peculiarity of

structure, it becomes untenable to suppose that such constituted the cause of the peculiarity now mentioned.

3. There are good reasons for believing that the abortions and premature deliveries now spoken of were attributable to morbid action being produced in the embryotic or foetal being, which destroyed its vitality, and thus rendered it subject to the operation of those laws in the animal economy necessary for the expulsion of a foreign body. It is previously said, that the blood was highly venoid, and that the bile morbidly circulated in the vital fluid; and below it is shown that the poisonous product, urea, in many instances existed abundantly in the blood, which could not fail to exert a noxious influence upon the delicate and susceptible new being. This vitiated state of the blood, then, depending upon urea and cholesterine, together with being highly venoid, would form a common cause to the occurrence considered amply sufficient, and one that seems much more probable than the conjectures spoken of above.

When it is remembered that these abortions and premature deliveries invariably took place without even a single exception; that in the advanced stages of pregnancy the child was always born dead; and that no precautions or remedial measures seemed to have any power in averting this remarkable tendency of the uterus to expel its contents,—the only rational inference to be arrived at is, that a common cause existed in the system calculated to destroy the new being, and that this cause consisted in the presence of noxious agents in the maternal circulation.

There were several instances of pregnant women being in the hospitals at the time of the epidemic who were lying in genuine typhus. These, however, did not manifest any disposition to miscarry, like the gravid patients in the relapsing fever; indeed, I do not at this moment remember any case where a typhus patient miscarried; and, if such did occur, those cases were very rare, when compared with those labouring under the epidemic. In some instances of premature deliveries that came under my notice, there seemed to be a tonic action in the uterus, the orifice being sometimes so spasmodically contracted that it was with great difficulty the secundines could be removed. In certain cases I had to dilate the os uteri with the fingers for some time before the placenta could be withdrawn, and occasionally in instances where there had been considerable hæmorrhage. In one woman this was particularly the case; the hæmorrhage had proceeded to a great amount before I arrived at the ward; a foetus of about the sixth month was lying in a pool of blood; the secundines had not come away, and the os uteri was spasmodically closed; and it was not until after a considerable time that the orifice could be so far dilated as to admit of removing the placenta. Dr. Alison mentions two cases of premature deliveries, in both of which the child was born dead, and in each there was considerable hæmorrhage, although the uterus contracted well.

XII.—*The kidneys were often the seat of diseased action; and, in some instances, death appeared to be induced by the absorption of urea, which was discovered in the serum infiltrated into the ventricles of the brain; and this product was also found in the blood, both during life and after death.*

No branch of pathology has made greater advances than that respecting the kidneys; and, when we consider what an important office these organs perform in the animal economy; how liable they are to become affected in febrile diseases; and what serious results proceed from an impairment of their proper functional power, it is, then, not surprising that so much attention has been directed to the subject. In scarlatina, their affection has been thoroughly investigated, and, consequently, thrown much light upon the treatment of that disease; but renal complication in other forms of fever, especially in typhus, has not met with so much research, partly, perhaps, on account of morbid action in these organs being less suspected than more precise and careful observation would seem to warrant; hence it becomes important, if possible, to show that the kidneys, in fever of the continued form, are liable to take on a diseased action, and occasionally constitute the proximate cause of the most alarming symptoms.

An obstruction in the sudoriparous organs, which necessarily gives rise to a great increase of action in the kidneys, and, if continued, disorder of function and change of structure in these organs, is the manner in which scarlatinal dropsy is induced, and when it is recollected that it is at the extreme circulation where the grand phenomena of fever are located, in the various forms of continued fever as well as the exanthems; that during the febrile paroxysm the cutaneous tissue is in a great measure deprived of its natural excreting functions; that it is at the capillaries where the great processes of secretion, excretion, and assimilation are performed; that the evolution of effete matters, which are constantly produced by waste of the various tissues, is always carried on in an increased degree in fever, and that the kidneys are the organs by which such effete matters are conveyed from the system, it may readily be imagined how liable these organs will be to become affected, and what additional disturbance there would be created on a cessation of their proper functions by which the noxious effete matters would be retained, and the deleterious particles that ought to be removed carried into the circulation. In typhus, the decay and diminution of structure generally proceeds to a great extent, which is dependent upon excessive oxygenization, which diminishes the tissues, and thus produces an abundance of nitrogenised effete matters, which matters are mainly carried off by these organs. The skin, as it is seen, losing much of its proper excretional functions, a greater quantity of blood is determined to the kidneys, which has the effect of stimulating them to an excess of action, and this excess of action

is soon followed by a loss of functional power, and a congested state of the Malpighian and portal plexuses, superadded to which might be organic nervous disorder from primary irritation in the cerebro-spinal system; hence, the skin and kidneys in a great measure ceasing to perform their proper offices, the blood must then necessarily become iniquated from the retention of azotised matters, and which, if retained to a considerable degree, act with all the evil effects of a narcotic poison. The skin during health evolves a considerable quantity of nitrogen, but an excess of action on the part of the kidneys, so long as such continues, will counterbalance the loss of functional power in the former, and thus preserve the equilibrium of function in the system; hence, if an increase of action in some organ or organs does not compensate for a diminution of action in some other, general disturbance in the system must result.

The great disorder in the nervous and organic nervous systems in fever often prevents the counteracting properties which nature would otherwise supply; and it is thus, in fever, that the kidneys, from a vitiated state of the cerebro-spinal system, and consequent loss of organic nervous energy, fail to counteract the evils engendered by impairment of function in the sudoriparous organs; at least, such is a potent cause in addition to those before mentioned. The practitioner should not be satisfied, and deem that because the quantity of urine voided is normal, that the kidneys rightly perform their office, as their excrement functions may be seriously disordered notwithstanding the usual amount of fluid being given off. In the commencement of Bright's disease, there is often no diminution in the quantity of urine, yet the solids are retained; this is now mentioned, because in some cases of the epidemic, ureal symptoms were manifest where there was not a corresponding decrease of the excretion. Nitrogen being the chief constituent of urea (according to Berzelius not less than 46 per cent.), it is plausible to presume that where azotised effete matters are abundantly formed and retained in the circulation, owing to the phenomena of fever above noticed, this product will rapidly accumulate, and in proportion to its accumulation will be observed those effects upon the body acknowledged as producible by this salt.

In relapsing fever, the symptoms of urea morbidly circulating in the blood were first noticed by Dr. Henderson, and soon afterwards by Dr. Cormack and others. An analysis of the blood and also of the serum infiltrated into the ventricles of the brain showed the crystals of this salt in great abundance. In some patients there were good reasons for believing that urea was formed in the system with unusual rapidity, so much so as to lead to the opinion that a peculiar tendency to its generation existed. Liebig says, that urea is formed according to the degree of action going on in the system, —a statement which, if universally applied, has been denied by Andral, Becquerel, and Golding Bird. If, however, the theory of Liebig be correct, and considering that the circulation was unusually

high in the epidemic, we may thus in some manner be enabled to account for the production of this product in relapsing fever. The symptoms of the accumulation of urea were mostly noticed after the crisis, during the non-febrile state. This might be dependent upon some short time being required for its accumulation, and it might not be generated in any important quantity until at or near the crisis; again, as has been observed, the intense action of the skin at the time of the critical sweat might so affect the sudoriparous organs as to throw a greater amount of blood to the kidneys. There is little doubt that, in some instances in which the patients were reported to have died from jaundice, had a careful inquiry been instituted as to the action of the kidneys, it would have been shown that the proximate cause of death rather existed in the impaired state of these organs; and certainly these complications were not unfrequently co-existent. We are aware that the accumulation of urea is particularly prone to create inflammation of the serous membranes, especially in the arachnoid, pleura, and pericardium, yet although these affections were sometimes noticed, I am not prepared to say in what precise proportion they took place. In some of the worst cases, where ureal symptoms were present, it was quite obvious that the nervous system was labouring under some powerful depressant; the pupils became small and piercing, the extremities and surface generally of a lower temperature, the breathing quick, the heart's action enfeebled, and the intellectual faculties impaired: in fine, presenting all the appearance of narcotism. Powerful diaphoretics, in conjunction with stimulants, constituted the best remedial measures, and apparently confirmed the diagnosis. The instance of Janet Thompson may here be cited:—

CASE X.—*Urea found in the blood.*

Janet Thompson, æt. twenty-four, single; resides in Leith. Admitted March 12th. A stout plethoric young woman. States that she was seized with rigors on the 7th, which were accompanied with pain in the head, limbs, and over lumbar region. Previous to the shivering had felt indisposed for two or three days, but only slightly; had been in no communication with fever patients, but in the house from whence she came several persons had been ill in fever, though this was some time previously.

March 13th.—Sweated a good deal last night, and is now perspiring freely. Does not think that she has sweated so much before during her illness. Pulse 80, soft, of tolerable volume. Pain in head, which was so severe yesterday, has entirely gone. Complains of some stiffness in the arm and shoulder. Bowels opened from medicine taken last night. Tongue moist, but furred. Has not passed any urine since her admission (yesterday). No distension over hypogastrium, nor dulness on percussion. Feels heavy and drowsy, every now and then falling to sleep and waking in a short time with a start, and feeling (as she expresses it) as if she were

falling out of bed. Some dizziness and indistinctness of vision, with a feeling of heaviness over the eyes. No confusion in the mental powers, as she intelligibly answers every question made respecting her present condition, but cannot exactly state some of her previous symptoms.

R Nitratiss Potassæ ʒij.; Liq. Ammon. Acet. ʒiij; Aquæ ʒv. Sit Mist cap. ʒj. q. q. horâ.

14th.—Pulse 80, very irregular in its beats. Began to pass water yesterday in an hour-and-a-half after first dose of medicine. At 7 o'clock P.M. had made 6 or 8 ounces of highly-coloured urine; the whole quantity for twenty-four hours is thirty-four ounces. Has sweated a good deal since yesterday. Feels much brighter, and the uneasiness in head is gone.

Medicament. Cont.

15th.—Had slight shivering this morning; skin hot and dry; pulse 88. Urine 24 ozs.; sp. gr. 1024.

There is here an omission for some days as to the state of her case, and the next report is dated

22nd.—Pulse 120; skin hot; has an oppressed look; no stool to-day, but bowels were opened freely yesterday. No headache.

Mist. c. Nit. Potass. et Liq. Ammon. Acet. Rep.

24th.—Pulse 120, of fair strength; skin hot and dry; countenance has much of a sottish expression; pupils pretty large and equal; no decided difference between the two sides of the face when features are at rest, but a very apparent obliquity of the mouth, and protrusion of the tongue to the right side when desired to put it out, the left angle of the mouth being drawn out at the same time. On speaking, left side of mouth alone moves. She is not insensible, but her intelligence is obscure. Moves her right arm freely enough, but cannot squeeze with it so thoroughly as the left. There is a bright red patch, and a series of others downwards on the epigastrium and abdomen; a pale-coloured spot occupies the centre of the largest, and a similar one exists at carpal extremity of the left thumb. There is a superficial slough on left heel, and an ecchymosed spot on right instep; tongue dry; urine passed in small quantity.

Abradat. Capalitium. R Pulv. Nit. Potassæ ʒiss.; Aquæ ʒx. Sit. Mist. Cap. ʒj. q. q. horâ.

25th.—Pulse 116, of good strength. The hemiplegia remains as before; tongue dry; had several stools. Urine abundant, but not kept. On the left foot the upper surface of little toe is occupied by a small bulla of blood; another between that toe and the next. The spots on the epigastrium are not so large; that on the right thumb is converted into a straw-coloured bulla. Intelligence, pupils, etc., as before.

Mist. Cont.

26th.—Pulse 104, of good strength; right cheek as before; right pupil smaller than left, but not contracted; tongue dry, but clean;

pus in the bulla of the thumb; the largest bulla on left foot has emptied itself of blood, and the part is healthy below. The vibices are improving. Passes a sufficient quantity of urine.

Habeat. Pulv. Jalap. Co. ʒj.; Mist. Cont.

27th.—Was observed in the morning in a state of stupor, being incapable of observing or replying. Was ordered by Dr. Craigie's clerk to be cupped about an hour ago. Pulse, at present, 150, very feeble. Is incapable of comprehending or replying to questions. The right pupil is considerably dilated; no effect is produced on the eyelid on thrusting the hand towards the eye; left pupil is smaller, not so contracted, and she winks on thrusting the finger towards the eye; even irritation of the conjunctiva produces but little effect on the right side; no motion of the right arm is produced by irritating it, and it is quite in a state of resolution; pricking it, however, produces an expression of pain. Above the inner condyle of the right femur, and below the inner aspect of the left knee, parts which are said to have been lying in contact, there are spots of corresponding size, of two inches long by an inch and a quarter broad, consisting of red discolouration, containing a deep purple one nearly two-thirds of the size of the whole spot; around the redness there is a halo of a lemon colour; a scaly eruption of sudamina on the belly. A large bulla, containing apparently blood, has formed on the outside of the left foot. Urine passed in bed, quantity of which cannot be accurately ascertained.

Habeat Sp. Communis ʒiij. Cap. ʒi in aquâ cald. omni secund. horâ.

28th.—Died last night at 11 o'clock.

REMARKS.—Infection seems to have given rise to her fever. On the sixth day of her illness there was some suppression of urine, which showed its effects in the cerebral symptoms, as noticed in the report. The next day (after the administration of pretty large diuretics), when the secretion of the kidneys was restored, the drowsiness and indistinctness of vision were removed. In the report of the 24th inst., and the seventeenth day from the commencement of her first attack, it is very evident that a serious affection of the brain existed, and there was partial suppression of urine; the diuretic medicine was again given, and although the kidneys were brought into action, yet the lesion which had evidently taken place in the head was in no degree removed. On the morning of the 27th, the preludes to dissolution were indisputably present; the urine was voided in decreased quantity, the sensific nervous power in the affected side in a great manner lost, the intellect obscured, and other indications foretold the near approach of a fatal issue. The vibices and bullæ spoken of in this case were, perhaps, in a great degree dependent upon the circulation of urea, because this salt, by uniting with the elementary principles of water, is transformed into the carbonate of ammonia, which has the power of dissolving the fibrin of the blood, and thus rendering hæmorrhagic effusions, transudations, etc., liable

to occur. My friend, Dr. Michael Taylor, analysed the blood taken by cupping, and discovered crystals of urea in considerable abundance. The post-mortem examination showed an anormal quantity of serous exudation in the ventricular cavities of the brain.

When it is considered how great is the ambiguity which mystifies the fundamental pathology of fever, it becomes exceedingly interesting when the proximate cause of death is so fully understood as in the case above. Yet, on the other hand, there were instances occurred in which a fatal termination ensued without any explicable cause being observable to elucidate the mode in which death had been produced. The next case is one in which the patient died without any cognizable lesion calculated to arrest the vital functions being discernible.

CASE XI.—*On dissection, no lesion to account for death.*

Mrs. M^cPowrie, æt. fifty, married; from 50, Blackfriars Wynd; accommodation pretty good. Admitted September 25th.

Has for some years past been of intemperate habits; volume of flesh rather spare; colour of skin natural; countenance febrile-looking, and eyes slightly suffused. About three weeks previous to admission was somewhat indisposed for a few days, but subsequently recovered. On the 16th inst. was taken ill with general muscular pains, headache, shiverings, sickness, etc., which were followed by floodings and slight sweating. Since that time has continued to experience a continuance of her pains. Cause assigned was contagion. On entering the hospital, the symptoms were as follows:—Pulse 60, of moderate strength, and regular; tongue covered with a whitish fur; bowels opened by medicine; temperature natural; no exhalation nor cutaneous eruption; slept well the previous night from a dose of muriate of morphia. In the morning the headache had greatly subsided, and the intellect was clear and collected. Still complains of great pain, and muscular power much enfeebled. Has some abdominal and epigastric tenderness upon pressure.

Mist. Salin. Diaph. ʒvii. j. ; Cap. ʒj. 4ta q. q. horâ.

26th.—Pulse 80; temperature moderate; epigastric tenderness still considerable; complains of general pains and headache.

27th.—Much the same to-day.

28th.—Passed a tolerably easy night; bowels open; no sweating; still has pains, and is much debilitated; tongue brown and inclined to dryness; pulse 100; skin hot; epigastric tenderness considerable.

Ordered the following:—R Vini Ipecac., Vini Ant. Tart. aa. ʒij. ; Sol. Mur. Morph. ʒiss. ; Aquæ ʒij. Sit Mist. Cap. statim quart. partem et rep. omni quarta horâ.

29th.—Yesterday evening, 7 o'clock, she very suddenly sank into an exhausted condition, being unable to move as previously; at the same time the surface (especially on the lower extremities) became cold; pulse 100, extremely weak. Wine was immediately administered, half an ounce being given every half-hour. At mid-

night, little or no improvement having taken place, the quantity was increased, and some whiskey given. At 5 o'clock in the morning the pulse was found improved, and the skin had become generally warmer and more natural. She had now taken eight ounces of wine and one of whiskey. The mixture was omitted last evening. Was restless this morning, being wandering and uncollected; tried several times to get out of bed. She now (visit at noon) lies on her side in a dull and exhausted condition, moaning occasionally as if expressive of pain; slumbers a little, but is easily awoke, and answers any question collectedly and rationally; pupils natural; tongue moist, dark in the centre; temperature moderate, but inclined to be chilly; pulse 122, soft, but of rather better strength than last night. There are, irregularly scattered over the body, dark, circumscribed, persistent patches. Wine to be continued.

30th.—Restless last night, when *gt. xxx. Sol. Mur. Morph.* were given, after which she slept until 3 A.M. Had no wine during that time; afterwards the stimulants were regularly given. Bowels opened by an injection this morning. She now lies in an exhausted condition, with the eyes half open, and apparently in a distressed state, being somewhat restless, moans, and the trachial râle is heard; gives some utterance in indistinct and inarticulate muttering. Is roused with difficulty, but appears to understand what is said, answering simple questions, though with exertion, then she soon relapses into her wonted state of dejection; eyes clear; pupils natural, but somewhat fixed, and there is a good deal of ramiform injection of conjunctiva. Protrudes the tongue readily, which is thickly coated with a yellowish fur, but moist. Temperature of surface elevated; hands and feet cold; pulse 120, compressible.

R. *Sol. Mur. Morph. ʒij. ; Mist. Camph. ʒvi. ; Sit Mist. Cap. ʒj. 4ta q. q. horâ.* Hot bottles to be applied to the feet.

Oct. 1.—Continued to sink, and died last night.

Sectio Cadaveris.

HEAD.—*Brain* presents much about the natural appearance; no effusion into the ventricles, nor any softening or injection.

THORAX.—*Lungs* much loaded, yielding on pressure a copious flow of frothy serum, mixed with blood; crepitant pretty generally; both lungs are attached by old adhesions to the pleura costalis, especially the right lobe, which was very voluminous. *Heart* natural.

ABDOMEN.—*Liver* healthy, weighs 2 lb. 6 oz.; bile thin. *Spleen* rather soft, somewhat congested; weighs 6 oz.; otherwise of natural appearance. *Kidneys, stomach, intestines*, and other parts, quite healthy.

REMARKS.—This woman's case affords a good example of what we occasionally see in fever, viz., a gradual and irremediable declension of vital power; a sinking of nature which no efforts can obviate.

The sudden manner in which she lapsed into a state of exhaustion, as well as the symptoms which then were ushered in, suggest that the brain was the seat of lesion; the post-mortem appearances, however, gave no acknowledged evidence as to the true cause of death. A sudden sinking of this description occasionally occurs in fever patients, after the disease has reached its acme, and all danger seems past. Two instances I particularly remember of what is now stated. These were in the persons of two females under the care of the late Dr. Graham. They came into the hospital in the epidemic fever, and passed through the disease in the ordinary manner, and had so far improved as to be placed upon a better diet. They both died suddenly during the night, sinking as if from a general failure of action in the vital organs, nor did the inspections throw any light upon the real cause of such unexpected terminations. In convalescents from typhus I have known the same occur, and Dr. Graham then informed me that, during the many years of his practice, he could call to mind many similar instances in which fever patients had died in this unaccountable manner.

XIII.—*Muscular and arthritic pains were exceedingly common during convalescence.*

The brief observations to be made upon this head might, perhaps, with more propriety, have been placed under the sequelæ, but as the pains in question were experienced during the febrile paroxysm, as well as in convalescence, and as this peculiarity formed a striking feature in the pathology, the fact is here noticed. At the first the affection was attributed to changes of temperature or peculiarities in the weather, but as the patients complained the same of those pains when they had not been removed into another ward, at all seasons and under all varieties of the atmosphere, it was obvious that the cause was referrible to the disease, and not to extrinsic influences. Sometimes the larger joints, especially the knees and elbows, were so considerably affected, and the muscular pains so severe, as to demand a somewhat active treatment; in the generality of cases, however, these pains called for little, if any, remedial measures, and as the patient recovered his strength they gradually decreased. When complained of during the paroxysm of the fever the severer cases seemed to resemble acute rheumatism, but the redness and swelling so common in rheumatic fever were not present. Welsh, in his work previously alluded to, notices the same fact as being common in the epidemic of 1817-20. A very common symptom," says that author, "occurring sometimes in the disease, but oftener during convalescence, was rheumatic pains of the joints, which occasioned considerable annoyance to the patients, and were removed with difficulty." Dr. Cormack says that he "found arthritic and general pains in jaundiced cases most severe, an observation worth regarding, from the connection which subsists between jaundice and rheumatism, as has been particularly adverted to by

Dr. Graves." Gillkrist, Moreno, and certain other writers on the yellow fever, mention pains of a similar description taking place in patients labouring under, and recently passed through, that disease. Probably the most plausible supposition respecting the cause of these pains would be to refer them to an iniquated state of the blood, arising from impairment of function in the renal and sudoriparous organs, thus vitiating the vital fluid by the non-removal of these noxious particles from the circulation, which are produced from the nitrogenised effete matters, so abundantly evolved during the progress of fever, as before mentioned, and which during health are conveyed from the system by their natural excretory channels. In Table No. VI., out of 450 cases, 375, being 1 in 1·2, or 5 cases out of 6, had those pains during the febrile paroxysm or convalescence, but most especially in the latter. In Table No. VII., out of 40 cases, 23, or 1 in 1·73, were thus affected; and in Table No. VIII., out of 80 cases, 40, or 1 in 2, had the same during convalescence.

XIV.—*A peculiar form of ophthalmitis not unfrequently supervened during convalescence.* (See SEQUELÆ.)

XV.—*The mortality was very small.*

The mortalities of fever vary according to the particular type of the epidemic, the season of the year, the class of people with whom it is chiefly restricted, together with innumerable other moral and physical influences by which the results are importantly modified. In the pestiferous localities of cities and large towns, where the lower orders are, from a multitude of circumstances, particularly prone to disease, there the deaths are always greater, notwithstanding the essential characters of the distemper being identically the same. This fact has long been particularly noticed in Edinburgh, where epidemic visitations of fever, from time immemorial, have been so common, and where there is such a manifest difference between the wretched poor of the old town and the respectable inhabitants of the new. In Glasgow, Dundee, and other places, the same observation might with equal aptness be applied, and it is deeply to be regretted that such an infinitude of circumstances are in operation in the large towns of Scotland, which not only propagate disease, but fearfully swell the bills of mortality. The average mortality of the epidemic of 1817-20 was 1 in 25 or 30; in that of 1826-7, 1 in 10·33; in 1837, 1 in 10; and in that of 1838 it was so high as 1 in 6·27. All these visitations, except the former, were of a strictly typhoid nature. In the yellow fever, to which disease some physicians said the epidemic of 1843-44 bore a great resemblance, or was a modification of, the mortality is sometimes so frightfully high that the recoveries form but mere fractional exceptions. At Barcelona, in 1821, nineteen out of twenty perished, and at Murcia in 1804, out of 134 cases there treated, not more than three or four recovered; and in this appalling affection it has often happened that two-thirds of those who took

it have been swept off! From the great difference which there is in this respect alone between the Scotch and true yellow fever, it is impossible to conclude that the former was in its essential nature like the latter. In the relapsing fever, according to the tabular forms which have been given, the average was 1 in 20. Dr. Cormack's cases averaged 1 in $16\frac{1}{2}$.

Post-mortem appearances.—The essential nature of fever, as has been previously observed, still being involved in much obscurity, every means whereby correct conclusions are likely to be arrived at should be carefully pursued; and none, perhaps, are so well calculated to ensure this desideratum as a diligent observance of the lesions discoverable after death. These lesions, however, are frequently so various in their character, so differently located, of all degrees of intensity, and sometimes even seem not at all to exist, or where they do, appear unimportant, and not calculated to arrest the natural actions of the vital organs; or it may be, are not cognizable in the present state of our knowledge; hence it is that the study of morbid parts in fever has not been attended with those satisfactory results which have proceeded from this mode of investigation relative to other diseases. It is before stated, that, whatever the fundamental nature of fever may be, it has a particular proneness during its course to institute the inflammatory state; this, it is most probable, depending upon an impairment in the nervous and organic nervous influence proper to those parts in which the inflammatory process is discovered, which, by producing derangement in the circulatory function, would be followed by the sequent train of inflammatory phenomena; hence, as before insisted, the lesions to be witnessed in fever are rather to be regarded as complications or results of a primary morbid state, than conditions constituting a first cause to the symptoms manifested. In different countries the fever of the continued form now in question presents lesions in certain parts more than others; and different epidemics, even in the same locality, rarely, if ever, are marked by precisely similar post-mortem appearances—a circumstance which, amid other considerations, argues in favour of the supposition, that the specific poisons essentially vary.

The deaths which occurred in this fever were by far most frequent in those instances of jaundiced complication; nevertheless many cases of inspection were to be noticed in which discolouration of the surface very slightly or not at all existed. The following description, which is a generalization deduced from a number of cases, most particularly applies to those instances in which the biliary secretion was deranged, and which constituted the most severe form of the disease.

External Aspect.—The yellowness of the surface was sometimes of a very deep tincture, and always became more intense after death; the face, neck, chest, and abdomen, were most highly coloured, and the conjunctivæ in the worst cases were of a saffron yellow. The penis, scrotum, pinna of the ear, and some of the flexures of the

body, occasionally presented dark, purplish-brown, ecchymosed-looking patches. In certain instances where blisters had been applied, the vesicated part exhibited a deep mahogany colour, the circumscription of which was clear and well defined. The livid patches referred to seemed rather to be the result of capillary exudation than that of speedy decomposition, as the bodies did not appear to decompose earlier in this than in typhus fever. *Brain*.—The encephaloid mass did not, as a general rule, manifest any marked appearance beyond what is seen in the kinds of fever with which we are more familiar: this of course varied according to the degree of active cerebral affection during life; and in certain cases there were the obvious traces of acute disease. The dura mater was scarcely at any time affected. Often an unimportant quantity of serous effusion was discovered beneath the arachnoid, as well as the yellowish-grey pustular-looking depositions of lymph so commonly noticed under this membrane in cases of fever. Sometimes the sub-arachnoid fluid was of an opaque milky-looking character. The centrum ovale was not more than usually studded with bloody puncta. The serum found in the ventricular cavities of the organ varied from a couple of drachms to two or three ounces, was of a slight straw colour when abundantly present, and in some instances, on being analyzed, presented the crystals of urea. *Lungs*.—These organs were less frequently found diseased than in typhus, and such lesion as existed was mostly of a bronchial character, as evinced by an increase of secretion and a vascular condition of the lining of the tubes. With regard to the *heart*, no states meriting notice were apparent. The *pharynx* and *oesophagus* were generally natural, without any epithelial excoriation, as spoken of with regard to these organs in yellow fever. Where there had been grumous vomiting, these parts were more or less besmeared with the dark matters similar to those found in the stomach and duodenum. The lining membrane of the *stomach* at times showed ecchymosed-looking patches, varying from an inch or two inches in diameter to the half of its internal surface. Adherent to the rugæ might be seen a glistening gelatinous-like substance, and it appeared as partly consisting of exuded blood. Where these patches were present, the membrane by which they were covered more readily broke beneath the fingers than it did in other places; and the submucous tissue, when carefully examined, exhibited the coagula of extravasated blood. Ulceration was of very rare occurrence. The cavity of the organ sometimes contained a dark grumous matter, very similar to that ejected in black vomit of yellow fever. These instances were, however, only in some cases noticed, and the dark bilious-looking fluid was much more frequently observed. The *duodenum* was often preternaturally vascular, but Brunner's glands very seldom ulcerated, and its contents were of a viscid bilious secretion, or matter similar to that to be seen in the stomach. With the exception of some degree of injection, the *jejunum* was unaltered. The *ilium* in many cases I carefully ex-

amed through the whole extent of its internal surface, and especially towards the cæcal extremity, and around the ileocæcal valve, where the glands are frequently found in an ulcerous state in ordinary typhoid, but in scarcely any or no instances was ulceration there found in this fever.

This morbid condition, so much spoken of by the French pathologists, and named by Bretonneau "dothinterite," was not a lesion at all common in the fever of 1843-44. M. Louis regards a disorganization of Peyer's glands as constituting the true pathology of a certain type of fever. Andral has shown that the ileum and cæcum are far more prone than the other bowels to be thus affected. Out of ninety-two cases given by Andral, the lower third of the ileum was ulcerated in thirty-eight instances, and the cæcum in fifteen. Occasionally some degree of vascularity, it is most probable chiefly depending upon the irritative properties of the bile, was noticed. There might also at times be observed some dark, brownish-looking patches, closely resembling the discolouration spoken of with regard to the villi of the stomach, and the mucous membrane corresponding with these stains readily gave way beneath the fingers. The submucous cellular tissue there contained extravasated blood. Dr. Cormack, in his dissections, particularly noticed this fact. Examinations made on the bodies of patients who were in the hospitals at the time of the epidemic, and died of enteric fever, very frequently showed ulceration of the lower bowels, and up to the time of the commencement of the epidemic (1842) the lesion in question was very much more frequently met with; but then the type of fever at that time prevalent was strictly typhoid, and consequently very different to the relapsing fever. What has been said with regard to the ileum may in a great measure be applied to the *cæcum*, as this organ presented no marked characters beyond what is related of the former. The *colon* was often injected, and sometimes presented the dark ecchymosed-looking patches above described. The solitary glands did not become disorganized. In no inspection which came under my own observation did the *rectum* manifest any very distinctive character, but Dr. Cormack, in two or three instances, discovered it intensely injected with submucous extravasation of blood.

From what has now been said relative to the digestive surface, in this form of fever, it is evident that there was a far less tendency to glandular ulceration than in enteric, which as well as true typhus had for many years previously prevailed in the large towns of Scotland, and even in protracted cases, where the patient had relapses, and thus some time subjected to the operation of disease, the lesion was not at all observed. A general state of congestion, it is shown, was the most marked appearance. From the accounts given by various authors respecting the yellow fever, it appears that in that disease intestinal ulceration is of unusual occurrence. No organ was perhaps so very generally affected as the *liver*, and

even in those cases in which yellowness was not present, and where there was little room for supposing that disease there existed, inspection demonstrated preternatural congestion. The serous covering very seldom bore any traces of inflammatory action, whilst the parenchymatous structure was mostly in a turgid condition. On making a free section the larger vessels were engorged with dark blood, which would slowly ooze from the divided surfaces, and a deep-olive yellowish viscid secretion might also be seen in unusual abundance. The colour of the organ varied, sometimes being of a dark reddish brown or of a paler hue; the former, however, was the most frequent. The *gall-bladder*, in every inspection which came under my own notice, was preternaturally distended with a dark bile, although the cystic duct was always pervious, and the reports of others who had witnessed autopsies bore testimony to the same. The bile in some cases was so much inspissated and very tenacious, that, by means of a dissecting knife, it could be raised in a ductile string to the height of three or four feet, or, if spread out, presented all the appearance of a coherent membranous substance.

There were few inspections in which the *spleen* was found perfectly natural, it being well nigh always in a greater or less degree congested, and sometimes so much so as to be four or five times its normal size. The capsule did not become inflamed, but the parenchymatous part was often found in such a state of disease as to readily break beneath the fingers, whilst its consistency might sometimes be termed diffuent, and the semifluid bloody matter had a jam-like appearance. I did not see any autopsy in which the organ had gone into the suppurative state. In one case which is now distinctly remembered, on making a section of the organ, the divided surfaces exhibited a number of yellowish white spots, varying from the size of a millet seed to that of a No. 4 shot. The microscope discovered them to be composed of pus-globules. The organs which were next most frequently congested were the *kidneys*, and minute examination showed the Malpighian and portal plexuses to be engorged with blood, which, on a section being made, imparted a mottled appearance. As in all descriptions of fever, the *blood* underwent certain morbid changes, and it is fully evident that one, and perhaps the most important, of such changes, was a diminution of fibrin; hence the tendency which there was to capillary exudation and petechial extravasation. On being drawn from the veins it was of a less formative consistence than natural, and Dr. Cormack says that the crassamentum was a spongy mass, instead of a firm fibrinous clot. That author also says that the microscope revealed lesion, as evinced by the presence of pus-globules, and in addition that the globules were found serrated and notched. From inquiries made personally of Professor Allen Thompson, who instituted the rescarches, it appears that there must have been some misunderstanding on the part of Dr. Cormack, as the former did not corroborate the statement which is made by the

latter in his work. Pus-globules certainly did not exist in the blood. In order to be fully satisfied on this point, I procured the blood of a number of patients in different stages of the disease, which my friend and late teacher Dr. Hughes Bennett (whose histological acquirements, especially with regard to morbid anatomy, are well known to the profession) had the kindness to carefully examine, and this gentleman assured me that no pus-globules existed, nor yet the serrated and notched appearance as reported to have been observed by Professor Thompson. Dr. Bennett also informed me that, being anxious to discover, if possible, in what the lesion of the blood in fever really consisted, he with great care examined the vital fluid in a hundred cases of typhus, in different durations of the disease and under various complications, but did not find any structural differences in the globules, and, indeed, arrived at no satisfactory conclusions. The *osseous* and *white textures* generally were, in marked cases, tinged with a yellow tinge.

From what has now been said relative to this particular part of the inquiry, it will be seen that the liver, spleen, and kidneys were the organs in which lesion was most frequently detected, such consisting of a highly congested state, which could not fail to exert the most deleterious influence on the functions of the latter and the former, and thus from an impairment of the actions of these organs certain morbid processes were sure to be instituted in the system, calculated to be attended with serious results. In the form of fever usually termed continued, common to these islands, as also other parts of Europe, the researches of modern pathologists have demonstrably proved that the lesions most frequently discoverable are serous effusion into the cavities and beneath the membranes of the brain, with great vascularity; an injected condition with morbid secretion in the bronchial tubes, ulceration in the digestive surface, especially in the glands proper to the mucous membrane, etc. These discoveries were chiefly made by the physicians of Dublin, Edinburgh, London, and Paris, and have up to this time been considered as correct conclusions. If, however, we are to account the fever at present under description as strictly belonging to the continued class, of which there is no doubt, it is evident that the morbid anatomy has presented unusual characteristics, as organs in the autopsies of that distemper were as the rule affected, which in typhus and enteric were far less frequently diseased. It is true that embarrassment of function, and change in the structure of the brain, was sometimes noticed, as observed by Dr. Alison, yet there were often good reasons for believing that the head symptoms, and the changes which took place in the encephalon, in some of the worst cases, were frequently referrible to a perversion of the secretional functions of the liver and kidneys, most especially of the latter, as it has been endeavoured to show that certain cases presented all the symptoms of being affected with a narcotic poison, thus rendering the head complication of a secondary rather than a primary nature.

IV. THE SEQUELÆ.

Sequels of fever of the continued form are not frequent occurrences, and, when observed, are seldom in persons of hitherto robust health and unbroken constitution. Individuals in advanced life—those who have previously had visceral disease, and thus a proneness left in certain organs to the re-establishment of morbid action, or where the vital powers have long laboured under some powerfully depressing agent—are circumstances chiefly giving rise to post-febrile affections. In those instances of fever in which, during their course, there has been an inflammatory complication of some organ, such structural changes may have taken place, so that its functions cannot be regained simultaneously with the cessation of the idiopathic fever, and thus, from such impairment of its action, certain anomalous conditions be instituted in the system so as to constitute disease. This particularly applies to the hepatic and renal viscera. The circulatory function being so affected, as it is, in fever, most especially in the intermittent type, congestions in the parenchymatous viscera are very liable to occur; hence the spleen in that form frequently becomes considerably enlarged; and, as previously insisted, the distemper in question presenting some characteristics of the intermittent nature, it might have been supposed, as was the case, that this organ would often be increased in size. The congestion of the spleen, however, has previously been adverted to, and considered as a complication, although it not unusually continued in an enlarged state long after the febrile phenomena had subsided, and thus, perhaps, might not improperly have been mentioned here. Such sequels as were most frequently noticed are briefly described below; yet, notwithstanding, a few isolated cases of post-febrile affections, to which no allusion is made, sometimes occurred; but, as these seemed rather dependent upon previous conditions or adventitious circumstances, than on the distemper, they have been silently passed over.

The first sequela now to be spoken of is one that very commonly succeeded, and was of the most unusual character, viz., a peculiar form of *ophthalmitis*, which often became manifest long after the patient had been dismissed the hospital. At the first these cases were regarded as mere accidental occurrences, not being attributed, as subsequent experience showed to be the fact, to any causes originating in the disease under which they had recently laboured. None of the usual forms of fever of this country possess such a tendency to produce the affection in question as the relapsing fever; and, with one exception, I am unaware of any epidemic recorded where the same has been observed as a sequel. It is true that the ordinary typhus will sometimes be succeeded by some visceral disorder, but such instances are generally referrible to some pre-existent state, and are mere occasional occurrences. The epidemic referred to in which the same was noticed, was the Dublin fever of 1826; and Dr. Jacob, of that city, published an account

of a post-febrile ophthalmitis which had been undoubtedly of a very similar description to that now related. All the textures of the eye seemed subject to become diseased; the conjunctiva and sclerotic would be intensely injected, whilst ulceration of the cornea, discolouration of the iris, contraction of the pupil, dimness of the capsule of the crystalline lens, etc., showed that no particular part of the organ was the special seat of disease. The premonitory symptoms were most generally a state of amaurosis, which preceded the manifest appearances for the space of some days. In Glasgow, Paisley, Dundee, Aberdeen, etc., the same affection was observed. Dr. Douglas MacLagan, at one of the meetings of the Royal Medical Society, said that a few days previously he had been at the Glasgow Eye Infirmary, and that in less than an hour twelve or fifteen patients presented themselves with this disease at that institution! From what was seen of the disease by myself in the Edinburgh hospitals, no particular age seemed to confer an immunity, and the time which intervened between the fever and this sequel varied from a couple of weeks to three months; but the most frequent time was five or six weeks. When they presented themselves at the hospital, the conjunctiva was mostly a good deal injected, and the patient complained often of acute circum-orbital pain. The best account given of this sequela is by the eminent oculist, Dr. Mackenzie, of Glasgow. The following facts are given relative to thirty-six cases which came under the author's notice. Twenty-seven were females, and nine males. In eighteen cases the right eye was only affected; in ten the left only; and in eight both eyes together or consecutively. The following were the ages of the patients: viz., below ten, 2; from ten to twenty, 17; from twenty to thirty, 9; from thirty to forty, 2; from forty to fifty, 3; and from fifty to sixty, 3. Mr. Wallace, who wrote on the affection in question, as noticed in the Dublin fever, and quoted by Dr. Mackenzie, says, that out of forty cases only four had the disease in the left eye, and only two in both—facts which in a great measure coincide with what has been delivered by the last author. Dr. Mackenzie thinks that the arteria centralis retinæ and vasa longa first became affected, and that the irritation extended to the ciliaries, etc. It is also stated in the paper now quoted from that the disease bore a very close resemblance to the ordinary catarrho-rheumatic ophthalmitis, as well as there being a likeness to syphilitic ophthalmia. Dr. Mackenzie gave it the name of *ophthalmitis post-febrilis*.

The following is an example:—

CASE XII.—*Peculiar form of ophthalmitis coming on during convalescence.*

Sarah Ewart, æt. twenty; married; a dressmaker; complexion dark; volume of flesh good. Admitted December 11th. States, about two months ago was admitted into the hospital with epidemic fever, which she had in the ordinary form. Did not relapse, and

was dismissed at the end of five weeks (November 23rd). Two days after having left the institution, felt the powers of vision of left eye somewhat impaired. On the 28th experienced some pain, and this increased, accompanied with redness and lacrymation, until the day of her re-admission.

To-day (11th) complains of severe sense of pain in left eye, which upon examination shows the conjunctiva to be much inflamed and injected. Has some cough, which she has had for many years; sleeps well; appetite good; skin cool; bowels open; tongue clean; pulse 84. Complains of no other pain.

Temp. Sinistro app. Hirudines xii. Foveat ocul. c. Decoct. Papav. somnif; habeat h. s. bolum cum Pulv. Jalap. Co.

Dec. 12th.—Leeches bled well; bowels opened by bolus three times; little change in the appearance of the eye; perspired a good deal last night; pulse natural.

R. Zinci Sulph. gr. xii.; T. Opii ʒss.; Aquæ ʒviij. solve; sit collyrium sæpe utend. R. Sulph. Magnes. ʒij.; Pulv. Aut. Tart. gr. ij.; Aquæ Fort. lb. ij. Sit Mist. cap. ʒij. statim et rep. om. secund. horâ donec alvus soluta fuerit.

13th.—Some improvement in the eye this morning; pulse soft, of moderate size and frequency; bowels freely opened without producing any nausea.

Temp. Sinist. Cucurbit. Cruent. et detrar sanguin. ad ʒvi.; app. Sol. Cathart. Cont.

14th.—Cupped to ʒvj. with considerable relief to the eye, which is less inflamed; iris possesses perfect power of contraction and relaxation, and does not appear the least affected; pulse natural; had three or four stools.

H. Som. sum. Bolum c. Calomelanos gr. x. et Pulv. Opii gr. iss.

15th.—Eye much the same to-day.

Temp. Sinistro Emp. Lyttæ appl.

16th.—Blister has risen; eye much less inflamed.

Infra ocul. hirudines xii. applicentur. R. Calomelanos gr. xii.; Pulv. Opii gr. iij., Cons. Ros. q. s.; divide in pilulas vj. Cap. i. q. q. horâ.

20th.—Gums slightly affected; blister discharges; eye appears much better; pain gone.

Pil. Calomel. ter quotidie tantum contr.

22nd.—Gums still slightly affected; inflammation of eye subsides; no pain; bowels open; pulse regular.

Pil. cont. bis die tantum.

24th.—Continues to improve.

26th.—Inflammation of eye nearly gone; no pain; bowels open; tongue and pulse natural.

28th.—Improves.

29th.—Dismissed cured.

REMARKS.—In the above case, as in the majority of instances, the amaurosis preceded other morbid conditions; the redness and lachrymation, however, soon succeeded, developing active inflammation, while the severe pain complained of on the 11th inst. was, it is highly probable, solely attributable to the general congestion of the organ, producing pressure upon the sensific nerves, and not to mere neuralgia, because this pain was not urgent until the conjunctiva and sclerotica were injected, and as soon as the vascularity was diminished the pain also subsided; this is mentioned, because in some affections of the eye considerable pain may be experienced without any trace of positive inflammation. The iris maintained its natural state, yet, according to the surgeons of the Edinburgh Eye Infirmary, who, of course, saw much more of the disease than was to be witnessed in the hospitals, the iris was very generally affected. The treatment observed in this case was of the antiphlogistic order; Dr. Mackenzie placed much reliance upon depletion and mercurials, and where the pupil became implicated he uniformly applied belladonna. That surgeon also, with much benefit, gave quinine, which Mr. Wallace conceived, during the Dublin epidemic, to possess a specific influence on the disease; this, however, is very doubtful.

Glandular affection.—The parotid glands, more than any other, during convalescence become diseased; in some few instances, however, the submaxillary and inguinals were enlarged. Persons of a strumous habit, with whom glandular enlargements are most common, are usually the individuals attacked with this sequel; generally speaking, this sequel was not of frequent occurrence.

CASE XIII.—*Affection of the parotid glands.*

William Melrose, æt. fifty-five, admitted December 5th, was seized with rigors previous to admission, and had taken aperient medicine; on admission complains of headache, some abdominal tenderness, and severe arthritic pains. Skin hot and dry; pulse 100; much thirst; anorexia; tongue dry, and covered with a whitish yellow fur; some degree of tendency to yellowness; is restless, and cannot sleep; urine copious; bowels open.

Habeat H. Som. Calomel gr. v.; Pulv. Doveri gr. x.

6th.—Feels better; passed a good night; bowels confined; slight yellowness yet continues.

Statim sumat bol. c. Pulv. Jalap. Co. ʒi.

7th.—Is more feverish; urine scanty; intellectual faculties somewhat impaired; no pain in abdomen, nor over region of liver; skin hot and dry.

R Sp. Æth. Nit. ʒss.; Potassæ Nit. ʒi.; Liq. Amm. Acet. ʒiss.; Aquæ ʒvi. Sit Mist. cap. ʒi. 4ta. q. q. horâ.

8th.—Symptoms very slightly relieved; urine passed copiously.

Medicamenta cont.

11th.—Feels better to-day; less yellowness of surface; bowels

open; urine passed freely; skin cool; pulse natural; appetite returning. Continued to improve under a moderate allowance of stimulants up to

20th.—Complains of slight shivering; tongue coated; skin hot; some degree of tenderness and swelling of the right parotid gland, accompanied with some difficulty in protruding the tongue.

Cataplasma parti aff. appl. Habeat bolum c. Calomel. gr. iv.; Pulv. Jalap. Co. ʒss. Stimulant. omittantur.

21st.—Swelling increased in parotid gland, accompanied with greater tenderness; otherwise the same.

22nd.—Swelling of parotid more prominent, and submaxillary gland is also affected; pain over these parts increased since yesterday; slight cough; tongue still protruded with difficulty; pulse rather weak.

Cataplasma Cont.

23rd.—Much the same; no appearance of amendment; swelling considerable.

24th.—Pain and swelling of right side of neck and face advancing, coupled with hardness over the laryngeal cartilage, and some tendency for the same morbid condition to be extended to the left side and left parotid gland.

Cataplas. amp. inter aures imponatur. Statim sumat Pulv. Jalap. Co. ʒj.

Cough much the same; pulse not weaker; and except from pain caused by mechanical pressure over air-passages, states himself easier.

25th, *Mane*.—The swelling is generally greater, accompanied with increased difficulty in the performance of respiratory motion. Slight fluctuation over right parotid gland, in which direction a puncture is made, and from which ʒij. of matter are evacuated of a thickropy consistence. Complains of cough being more troublesome; countenance somewhat sunk, and expressive of anxiety and uneasiness.

8 o'clock, P.M.—Breathing becoming rapidly worse; intellectual powers perfect; has difficulty in speaking; complains of pain in the chest. These symptoms continued to increase in intensity, and at 10 o'clock, P.M., he gradually sunk.

Sectio cadaveris, 36 hours after death.

HEAD.—*Brain* healthy, as also its membranous coverings.

CHEST.—*Lungs* have considerable old pleuritic adhesions; at the apex of the left lobe is a cicatrix communicating with a degenerated tubercular cavity, which is filled with a calcareous deposit. Base of right lung indurated, and passing into the state of grey hepatization. On pressure a frothy muco-purulent matter is exuded; this applies, but less generally, to the left lung.

HEART.—Healthy.

ABDOMEN.—Viscera healthy.

NECK.—The whole of the right parotid gland is softened, and in

some places presents cavities filled with pus, but these do not communicate with each other. Some degeneration has commenced in the concatenate glands, all of which are softened. Left parotid is passing into the same condition, but in a less degree of advancement. Thyroid gland healthy.

CASE XIV.—*Affection of the parotid gland.*

Mary Ogalvie, æt. seventeen, admitted November 8th. Complexion light, and of phlegmatic temperament.

Had the epidemic in its ordinary form, and her case might be considered as one of a very mild description. Relapsed on the fourteenth day after the crisis. Two days after relapse experienced some pain over the right side of the neck, where, upon examination, slight swelling was perceived, the parotid gland appearing a good deal enlarged. Two days subsequent to this, three or four incisions were made after the previous application of fomentations and poultices. Warm applications were again applied with a repetition of the incisions in the course of two days more. Antimonials and purgatives were given at the same time. The sub-maxillary gland also became affected, and a similar course of treatment pursued, and under which a speedy recovery was the result.

REMARKS.—In the first of these examples it is seen that the inflammation of the parotid was of a very persistent character, and the measures adopted exerted but little, if any, influence on the progress of the disease. The mechanical obstruction produced in the air-passages added much to the general disturbance, and tended to usher in the fatal result; besides, there are good reasons for believing that the recurrent laryngeals might be so much subjected to pressure as to impair their functions, and thus the action of the larynx be seriously affected. The inspection of the body did not present such morbid appearances as to satisfactorily account for death, none of the vital organs evincing particular structural changes, with the exception of the lungs, and thus the disease was chiefly confined to one lung, and this was far less than what we generally observe in those instances of pneumonia which proceed to a fatal termination. Upon the whole, perhaps, the most correct conclusion would be, that the general prostration incident upon the febrile course, in conjunction with the additional disturbance induced in the air-passages, was the true cause of death. Respecting the girl Ogalvie, it may be remarked that the free incisions which were made in the gland were followed with the best results, and from that operation the turgescence and other inflammatory symptoms quickly subsided.

Sloughing.—In such fevers as assume the adynamic type, where the vital powers are much prostrated; and where there has been a long and tedious course of disease; where the voluntary muscular system is much deteriorated, and the patient long continues in one position, destruction of the integuments and often of the deeper tissues is not uncommonly witnessed. Again, in those forms of fever in which the

disease quickly passes through its stages, and thus the prominent parts not being affected by pressure, sloughing is an uncommon result; and thus it was in the relapsing fever that this sequel was of far less occurrence than in typhus. In yellow fever bed-sores are said to be very uncommon.

CASE XV.—*Sloughing of integuments.*

Jean Morrison, æt. thirty-one; a servant: admitted October 9th.

Her attack was ushered in by the ordinary mode of accession, nor did any unusual symptom present itself until the

12th.—This morning there is slight yellowness of the conjunctiva, and a tawny tinging over the surface generally, especially on the chest and superior extremities.

Habeat Ol. Ricini ꝑss. statim.

13th.—Yellowness more distinct; urine scanty, and high-coloured; fæces dark and bilious looking; tongue covered with a whitish yellow coat. Slumbers a good deal to-day, but slept little during night. Some pain on pressure over right hypochondrium, extending to epigastrium: pulse 108, small, and rather compressible.

Sinapismus epigastrio applicand. Emp. Lyttæ vertici imponatur. Habeat bolum c. Calomelanos gr. iv. et Pulv. Jalap. ʒj; Vin. Rub. ʒvj; Sp. Communis ʒiv.

14th.—Feels easier this morning; bowels opened by powder; stools bilious; skin not quite so yellow; less pain in epigastrium; looks more lively; tongue cleaner and moist; pulse 100, of better strength.

Vin. et Spiritus cont.

15th.—Continues better; slept well last night; bowels open; tongue moist; pulse more natural, and of better strength.

Wine and spirits to be continued.

16th.—Continues to improve. Complains of some tenderness in lower part of back, where, upon examination, a slight circumscribed blush exists over the integuments covering the sacrum.

Ordered to lie upon the side.

17th.—Feels better of herself, but the back is reported to be exceedingly sore.

Cataplasma part aff. app.

18th.—Yellowness nearly gone; tongue cleaner; bowels open; pulse more natural.

Wine and spirits to be omitted.

20th.—Complains of nothing except the sore on the back. On examination, the skin looks much affected, and ready to peel off.

Cataplasma cont.

22nd.—The sore on the back discharges some exudating matter; the skin is broken, dividing at the line of demarcation.

Poultices to be continued. Lotio Plumbi lbij. sæpe utenda.

25th.—The slough on the back seems almost ready to come away, and the matter continues to be discharged.

Cataplasma cont.

28th.—On examining the back a deep concave sore is seen, of about three inches in length and two in breadth, which secretes a large quantity of purulent matter, the slough having come away. In other respects the patient continues to improve.

The case from this time continued to improve.

Ordered steak diet, with a pint of porter daily. Wine to be discontinued.

REMARKS.—The short space of time that this woman was confined to bed previous to the skin becoming inflamed, seems a brief period to cause the affection at issue. I well remember, however, that she was more than usually prostrated, and lay continually on her back in a very helpless state; she was a stout person, of a pale and relaxed appearance. A generous diet, together with the ordinary means of application, and preserving the parts from pressure, produced a gradual, though slow cure.

Boils.—These morbid conditions were, according to my own experience, of rare occurrence, and when they did take place were in instances of the yellow complication. A vitiated state of the fluids appeared to constitute the main cause of this sequela. On reference to Case No. X., it will be seen that the patient had several large bullæ, which are there described.

Ulcerative sores.—Sometimes during convalescence the physician's attention was directed to ulcerated sores on the inferior extremities, which for the main part occurred in the aged and infirm, and especially in such persons as had previously ulcerated legs. In some few cases an ulcerative sore was observed of unusual appearance. The spot at first presented a livid hue, or was an hæmorrhagic-looking patch, and clearly circumscribed. The superjacent cuticle became tense and shining, and at the expiration of three or four days it gave way, when dark coagula were exhibited, and a thin sero-purulent matter began to exude. The few cases of this description were uniformly observed on the inferior extremities, and varied from the size of a sixpence to that of a shilling-piece. Tonics, an improved diet, together with emollient dressings, soon promoted a cure.

Edematous swelling of the legs.—All diseases which produce a general declension in the vital powers tend more or less to the production of venous congestions; and this particularly applies to fevers, during the course of which debility forms a prominent feature, and thus the circulatory function often becomes so much impaired as to affect that nice equilibrium which there is in the distribution of the vital fluid during positive health; hence those congestive states which are generally noticed wherever there is considerable corporeal weakness. The greater the distance from the centre of circulation, the more tardy and irregular becomes the blood in its course; and thus it is that the inferior extremities from this cause, as well as that

which is superadded by the physical influence of retropulsion, which has to be overcome by the transmission of fluids in a direction contrary to the laws of gravitation, are rendered œdematous. The extreme vessels then become preternaturally distended, their contractile power diminished, and a tonic fulness is the result, which is followed by an exudation of the aqueous part of the blood into the surrounding cellular tissue. From this, then, it is evident that the greater the debility the more will this morbid process be liable to occur, and thus in those fevers which are of a typhoid character the sequel in question is far more common. In the convalescents from typhus, swelled legs were more frequent than in the relapsing fever, and in the latter those individuals who had previously had a bad and insufficient diet were most usually thus affected. A liberal allowance of food, the moderate use of stimulants, together with friction, bandages, etc., were the best means of remedy.

V.—THE TREATMENT.

Numerous as have been the doctrines from time to time advanced relative to the true nature of febrile diseases, such have scarcely been more various and opposite than the modes of treatment recommended. According to the particular pathological theories entertained are in some degree determined the kind of remedial agents to be employed, and thus it is that philosophical inquirers who have differed in their opinions respecting the ultimate nature of the disease, have been led to the adoption of curative measures which in their nature and action are highly opposed; and hence have been espoused two principal modes of cure, which, though modified according to the suitableness of existent circumstances, are the cardinal means whereby the affection is treated, viz., the depletive and stimulative methods. It is the want of decisive proof, and the need of demonstrative facts, which prevent the establishment of an unequivocal line of practice; and so long as the ambiguity that obscures the radical pathology exists, will there be the propounders of novel notions, and fresh examples of practice occasionally entertained in the *ratio medendi*. One physician will affirm that the prostration is wholly dependent upon local congestion, and consequently impairment of the function of some organ or organs, especially those termed vital, and hence has recourse to the lancet. Armstrong, in the early part of his life, was an urgent supporter of this theory, and his boldness in the vindication of it won for its zealous advocate the highest professional renown; but time, however, frequently the gradual but true exposé of human fallacies, dispelled the illusion, and at the latter end of his practice he became as imbecile in his treatment of fever, as he had before been daring and energetic. Another will say that the prostration is produced by some occult impression made upon the nervous system; that the loss of equilibrium in the circulation is owing to the impairment of nervous power; and that unless nature be assisted in her conflict with the

morbid agent, there would be a danger of her failing in the strife; therefore wine is liberally prescribed; a third, whose numerical recoveries are perhaps well nigh as great, pursues a middle course, or it may be observes a plan which from its simplicity and apparent inefficacy seems quite incapable of making any decided influence upon the progress of the malady. These statements, although they appear to reflect discredit upon the art, and show our notions respecting the real nature of the affection not to be precise and conclusive, are nevertheless true, as must be conceded by all those whose opportunities in the treatment of fever, and acquaintance with its literature, have been sufficient to enable them to judge. It must be remembered, however, that all writers of eminence are liable to cling to entertained hypotheses, and are seldom altogether unbiassed in their statements, so that some slight deductions should be made for partiality and preconceived opinion, and it may fairly be concluded that a rational treatment of fever, when founded upon the true principles of science and extensive experience, can do much in conducting the malady to a successful termination. To pertinaciously adhere to any particular form, is false reasoning, nor in any wise based upon philosophical inference, because it often becomes absolutely necessary to modify our measures according to exceptional circumstances and unforeseen exigencies.

Mere practical men and symptomatic treaters err by not anticipating the changes in the train of events which we know from previous observation are liable to follow, whilst the unpractised theorist is too often disappointed by his hypothetical notions being refuted by demonstrative facts. If these days of fashion and fancy in the cure of diseases have given to the world systems, which, arguing from all hitherto formed ideas and experience, appear but incongruous vagaries, their very refutation, and the discussion to which they have immediately and indirectly given rise, have certainly had the happy effect of incontrovertibly proving that we have with too much prejudice been wedded to long-received notions— notions which are sweepingly embraced, not from conviction of their truth, so much as from the warrant of precedence and the recommendation of ancient usage; such have also exemplified, that too implicit a reliance has in recent times been placed upon the virtues of medicines alone, and not sufficient importance ascribed to regimenal rules; that active interference is not only often of no avail, but positively injurious; that the power of hope and confidence are not a little beneficial; and that the unaided efforts of nature can of themselves frequently work out their salutary operations. In so far, then, the innovations which an age avaricious of novelty has admitted, have been of some service in bidding us to impartially inquire; and thus it may be, that the promulgation of error may have with its leaven elicited some issues of truth. Whatever may by the physician be deemed the most approved general principle of practice, every case, from the idiosyncrasies of the patient, the kind

of complication and its degree of intensity, the previous state of health and habits of the individual, the external influences to which he is exposed, together with other considerations, must indicate certain other modifications in the remedies administered, whilst that nice discrimination in the detection of local affections when in their incipient state is of essential importance.

When inflammatory complications arise they must of course be treated upon those general and acknowledged principles pursued in phlegmasial diseases, but always at the least possible expenditure of vital power; for it must ever be borne in mind that the system has to contend with a primary depressing influence arising from the noxious agent which it has contracted, since the abstraction of blood should never be carried beyond what is absolutely requisite, and such remedies as are likely to supply the place of bloodletting should sedulously be employed. On the Continent, and especially in Italy, the emetic tartar has with this view been much extolled. During the stage of high vascular excitement there can be no doubt of its often being highly serviceable, yet in my own humble opinion there are certain disadvantages connected with this drug which forbid its very general exhibition, as in the very young; in those far advanced in life; where the type of the fever inclines to the adynamic form; where the vascular excitement is not very marked, etc.; and also on account of its proneness to excite irritation in the digestive mucous surface, and thus laying the foundation of ulcerative lesion, a condition so frequently present in enteric. In many instances, however, this remedy along with others may avert the necessity for active depletion. It has before been stated that two epidemics are never observed exactly alike, and it may also be added that visitations occurring even within a very short time of each other may be of very dissimilar types, or even in the same locality simultaneously exist which are manifestly different in their nature, as exemplified in the fact of the relapsing fever and the ordinary typhus, being present in various parts of Scotland at one period. Hence, there being such differences in the nature of febrile attacks, it is conclusive that the treatment found highly serviceable in one form might in another be far less successful, and thus it becomes manifestly important to carefully study the particular characteristics of the disease, ascertaining by cautious measures what remedies are effective or hurtful. Sydenham and the older authors were fully impressed with this truth, and paid the greatest attention to what they termed the *juvantia* and *ledentia*.

There is no dispute that the fevers common to the British Islands have during the last fifty years become altered in their type, that is, they are now of a less sthenic and more of the asthenic nature; consequently demanding a line of treatment inclining more to the stimulative than the depletive order. Perhaps this change is more obvious in urban communities than in the rural districts, owing to the more numerous debilitating causes in the former than in the

latter, which of course would generate, in the class of individuals amongst which the fever spread, a proclivity to the adynamic character. It is always expedient to narrowly watch the progress of the disease, guarding against unlooked-for symptoms, and rendering assistance to the efforts of nature when she seems unequal to the task, when we become decided in what such efforts consist, for when once the disease has fairly commenced we cannot hope to cure, although we may guide it. The Cullenian aphorism to obviate the tendency to death is an axiom ever to be remembered, and all our views have reference to that great truth which science and right reasoning have established; so that, in the language of Tacitus, it might be said

“Ad utilitatem vitæ omnia concilia nostra dirigenda sunt.”

The patients on admission, if not too far advanced in the disease, or when there were positive contra-indications, were ordered a warm bath, which had the two-fold advantage of tending to restore the cutaneous circulation and rendering the patient clean and comfortable; nor was the latter of slight importance, seeing that a great majority of the patients were from the most squalid and filthy parts of the city, with whom personal cleanliness was very imperfectly observed.

(a) *Bloodletting*.—It is evident from the ancient writers that the abstraction of blood in febrile diseases has been practised from the remotest antiquity, and on the revival of letters this remedy was employed according to the views of the ancients, to whose opinions the physicians of the middle ages looked with implicit belief, and regarded with reverential respect. The older authors considered bloodletting of utility in subduing the tumultuous action of the circulation, and thus arresting an undue determination to the vital organs. The philosophic minds of Sydenham, Hoffman, and Boerhaave, believed that the timidity of their predecessors, who were less bold in their practice, was unfounded, and advocated a more extensive use of the lancet. The Cullenians, basing their practice upon a theory different to that of Sydenham and his disciples, did not carry out bloodletting in the same heroic manner, but used it more in the spirit of the Ovidian maxim, “in medio tutissimus ibis”; they bled, but with greater caution, and the notions of Gillkrest since his time have had an influence in modifying the practice; he stoutly insisted upon the mischief which might be done by injudiciously abstracting blood in fever, and strongly impressed the consideration of debility and putridity. Huxham and Pringle also advocated the same, and the opinion of a peculiar debility, which was long after entertained, undoubtedly imbued the mind of Cullen with that doctrine which has ever since exerted no slight influence on the treatment of this affection. From the time of that great systematic writer, amongst the warmest advocates of bloodletting have been Armstrong, Clutterbuck, and Welsh. That its proper employment in particular types

and under certain circumstances may be of some benefit none can dispute, and that its indiscriminate use has produced more disastrous results than any other remedy in fever, must at once be acknowledged. It sometimes happens that the physician meets with cases beset with perplexing difficulties, and where the most deliberate and nicest judgment is demanded; when excitement is passing on into debility, when determinations of blood in the vital organs are producing additional prostration, in advanced age, in the very young; where there has been other disease, the previous habits of intemperance, etc. It is in such instances where correct reasoning is of paramount importance, and where precipitancy of action and imprudent boldness are as liable to lead into error as to conduct to success. To moderate excessive vascular action is undoubtedly correct; it often happens, however, that this stage has passed its acme before the physician is called in, and sometimes the excitement of the circulation is never very marked. During the state of high vascular action, we may bleed to a greater extent than before or after such state, periods when it would be attended with less benefit, if not with positive harm.

When the action of the heart is quick and forcible, the skin hot, eyes suffused, breathing full and deep, excretions suppressed, and animal functions uninterrupted, we may with advantage bleed, for it is in this stage blood, by being sent to the visceral organs, founds the commencement of positive lesion; hence the best time for abstracting blood is at an earlier part of the disease, as the prevention of complication is more under our power than its cure. The want of a proper consideration of this fact has led to the grossest errors, and those who bleed at all times during the fever are ever unsuccessful in their practice. If good be done by means of the lancet, one bleeding will generally suffice. Hildebrand recommends moderate venesections and repeated; but at the outset of the affection, when the pulse is full and strong, it is decidedly better to make some impression upon the heart's action, and subsequently use the other auxiliaries in subduing the pulse. When the epidemic is particularly prone to give rise to inflammatory complications, general depletions can be employed more energetically, and it has been from the success which has followed bloodletting in the sthenic type that physicians have been led to overrate the efficacy of the measure; here, as insisted, it is always desirable to pay much attention to the nature of the prevailing distemper. Bloodletting has by some been recommended solely with the view to abruptly check the fever in its course, before the reaction has fully and fairly become developed. This cutting short of the disease is very questionable; we are aware, however, that by making a powerful effect upon the pulse a copious perspiration will sometimes succeed, the bowels and kidneys be acted upon, and thus after such excretions have become excessive, the patient will sometimes at once be restored to health, as if nature had become relieved, and the noxious agent expelled or rendered inert by such increase of excretional action. Speaking

from personal experience I have great reason to believe that such in very exceptional cases does occur. When physicians' resident assistant in the Edinburgh hospitals, it is my firm conviction that once, if not twice, the fever was averted in my own person by the induction of a very powerful diaphoresis before the reactive stage commenced, and as soon as the initiatory symptoms of chilliness and languor were experienced. Such instances were very rare, and I do not remember any case, where spontaneous reaction had taken place, of the disease being arrested in its course. This tumult of the circulation appears to multiply and develop the noxious agent in the blood, and to convey it with greater force and frequency through every tissue of the body.

The effect which the abstraction of blood has in fever is not often beneficial, and frequently of brief duration. It has already been stated that the pulse in relapsing fever would assume a degree of frequency so high, without there being any apprehensions of danger, which rendered this one of the many distinguishing peculiarities of the distemper, nor was bloodletting in any particular manner employed on account of such excessive vascular action; experience in the disease proving that this unwonted impetuosity in the circulation did not, as might have been anticipated, commensurately give rise to organic lesion,—another fact impressing us with the desirableness of studying the particular type; and not only should attention be paid to the nature of the fever, it is repeated, but also the individuals under our care. The lower orders of the inhabitants of large cities are far more liable than the inhabitants of the rural districts to present the adynamic form; and hence the treatment varies. In the Edinburgh hospitals, as may be seen from the tables which have been given, a great majority of the patients were from the wynds, closes, and pent-up streets in the Old Town and Leith; the emaciated and pale-faced denizens inhabiting which places are of too squalid and attenuated frames to indicate energetic depletive measures.

When the fever is of the inflammatory kind, even such individuals will bear some abstraction of blood. Country patients, from living in a purer air, being better fed, less given to intemperance, and other excesses, their more plethoric and fibrous habits, better constitutions, etc., are far more eligible for bloodletting; a truth generally acknowledged, of which my own opportunities of observation have supplied abundant proofs. The most important questions respecting bloodletting in this disease are manifestly these:—viz., does the debility, so distinguishing a feature in fever, proceed primarily from excess of action in the circulating system, and such excess of action give rise to congestion and inflammation in certain of the vital organs, and thus affect the organic nervous influence proper to such organs; or, is it dependent upon some remoter and more occult effect produced in the solids, from a preceding depressive influence exerted on the nervous system?

would lessening the current of the circulation always tend to avert the evils of local determinations? how long may recourse to the lancet be had after the vascular excitement has reached its maximum? and what are the decisive symptoms and conditions which lead us to rely upon other expedients, and constitute the preludes to more manifest indications of graver changes? These points are not satisfactorily established. If the proneness to local engorgement were solely owing to excited vascular action, the abstraction of blood ought then to be marked by more of that certainty of success which follows its employment in the phlegmasiæ. It seems pretty evident that, although an overloaded state of the visceral organs must necessarily contribute very materially to the general debility, yet another and primary cause is that of a morbid impression being made upon the brain, spinal marrow, and organic nerves, a doctrine which, in our practice, should never be overlooked. It must hence appear undeniable that much caution should ever be given to the employment of this remedy in fever, more especially when had recourse to at an advanced stage of the disease, for, if improperly and adventurously used, the most serious results may accrue. It might be said in the words of Lucretius,—

Judicio perpende, et si tibi vera videtur
Dede manus; aut si falsa est accingere contra.

The abstraction of blood in relapsing fever, though sometimes had recourse to, was not attended by those recorded advantages which appear to have been the case in the epidemic of 1817-20. It is true that the intense headache which there was would be relieved by depletion, but this alleviation would be only for a brief period; the pulse again rising, and the uneasiness and pain complained of becoming as great as ever. The copious diaphoresis which invariably determined the critical period lowered the pulse as effectually as blood-letting, and such reduction was permanent, nor were there those apprehensions of visceral lesions, accompanying a high pulse in other forms of fever, which sometimes seem to warrant the aid of the lancet. In certain cases of the young and plethoric with strong fibre and unbroken constitution,—when the pulse was full, forcible, and quick—in fine, where there seemed present a train of indications demanding abstraction, venesection did not produce those benefits which might have been anticipated; where, however, there was acute complication, its use was more decided. In all fevers bleeding is most rarely needed.

On reference to the statistics, it will be seen that, in Table No. V., out of 80 cases, 7, or 1 in 11·42, were bled from the arm; in Table No. VI., general blood-letting was adopted in 19 out of 450 cases, being 1 in 23·7; in Table No. VII., out of 40, 5, or 1 in 8; and in Table No. VIII., out of other 80 cases, only 4, or 1 in 20, were bled. Thus, out of an aggregate of 650 patients, in only 35 was general blood-letting employed, being but 1 in 18·56 of the

whole number,—a fact proving that the type of the distemper was not inflammatory. Comparing these with the statements of Welsh, the difference will at once be apparent. That author details particulars respecting 16 patients whom he treated most heroically, the average amount of blood taken from each of these being 85·4 oz., the average number of leeches applied was 15, and one man was bled from the arm seven times. Out of fifty other cases, thirty-four were bled from one to four or five times, and the quantities taken at each operation varied from ten to thirty ounces. These particulars are cited to show the great dissimilarity in the treatment, and of course in the nature of the two epidemics, corroborating what has been said on this point. Welsh, like all other men who espouse a particular theory, carries his doctrine to an extreme, by so urgently recommending the abstraction of blood in fever as a sovereign remedy. Observation and facts incontrovertibly prove the fallacy of such sweeping conclusions, and assure us that such practice cannot, under all circumstances, be pursued with like success, and that often it would be injurious.

Reasoning from my experience in relapsing fever, as well as from other types of the disease which have come under my notice, as also from the accounts which are given of febrile visitations in recent times, the following conclusions are deducible—viz. 1stly, It is always important to carefully study the particular nature of the prevailing epidemic, cautiously ascertaining by what effects depletion is followed. 2ndly, The class of individuals placed under our care, their previous modes of life, habits, and the external influences to which they have been exposed. 3rdly, The age, sex, and temperament of the patient. 4thly, The kind of complication, the particular organ or tissue affected, and whether it incline to the congestive or acute inflammatory form. 5thly, Blood-letting may be always had recourse to with more safety and greater advantage at an early than at a late period of the febrile course, and there is more liability to its evil effects in proportion to the advancement of the disease. 6thly, Those auxiliaries should be premised or employed in conjunction which possess depletive action, or are depressants, and do not so reduce the vital powers. Lastly, Its general abstraction should not be employed where local blood-letting would be sufficient. In this fever its *local abstraction* often effectually relieved the urgent symptoms, especially the head-ache, frontal pain, and sense of uneasiness or heaviness so often complained of at the hypochondria and epigastrium. On referring to the statistics it will be seen that cupping and leeches were employed as follows:—In Table No. V., out of 80 cases, 22, or 1 in 3·63, had leeches applied; in Table No. VI., out of 450 patients, 6 were cupped, being 1 in 75; 68, or 1 in 6·62, or 1 in 6½, had leeches to the head; 23, or 1 in 19·56, to the chest, and 16, or 1 in 28·12, to the abdomen. In Table No. VIII., out of 80 cases, 28 were treated with local blood-letting; 14, or 1 in 5·71, to the head; 7, or one in 11·42, to the chest, and 7, or 1

in 11·42, to the abdomen. Thus, out of 610 patients now instanced, 168 were locally bled, being 1 in 3·76 of the aggregate.

(b) *Emetics* were decidedly of service ; and, after their exhibition, certain of the symptoms, especially that of sickness, were not so urgent. Sydenham highly extols emetics, and says they should always be given when nausea and vomiting, in the initiatory stage, are present. There are conditions, however, which contra-indicate their employment, viz. when the patient is stout and plethoric, and when there is much pain and tenderness at the epigastrium. When these were given it was at an early part of the disease,—if possible before reaction had set in ; or, if that had taken place, blood-letting was first had recourse to ; for, in persons of plethoric habit, there is certainly some degree of risk in exhibiting vomits, and thus producing great fulness of the encephaloid vessels. Again, for the same reason it is not good practice to administer emetics at an advanced stage of fever, when the cerebral vessels are preternaturally loaded, and when further determination of blood, caused by violent straining, might give rise to rupture and sanguineous effusion. They seemed to be beneficial not only in clearing out the primæ viæ, and thus removing irritative matters, but also by detaching the gall-ducts, as the vomiting was always highly bilious, and restoring the cutaneous circulation,—thus relieving the visceral organs from their unwonted supply of blood. A scruple of the powdered ipecacuanha, with a grain of the tartar of emetic in a little syrup and water, or the ordinary wine of these drugs, were given. The solution of the sulphate of zinc also answered very well.

(c) *Aperients*.—Purgative medicines undoubtedly rank amongst the most important remedies in fever, as allowed by most authors who have written on the disease ; and when we consider how essentially necessary it is to maintain in proper action the intestinal canal, their virtue may not have been so much overrated. In types of the sthenic kind, where a depletive form of treatment is indicated, the judicious employment of this class of drugs is frequently attended with the most satisfactory results. Armstrong used to insist upon the desirableness of having two or three evacuations a day, and several authors of eminence recommend the bowels being opened twice during the twenty-four hours ; but no writer of modern times has descanted with so much warmth and decision of opinion on their efficacy in fever as the late Dr. Hamilton, whose treatise is too well known to be more than merely mentioned here. Where there is not much reason to apprehend irritation in the mucous membrane of the digestive surface, and where the type is sthenic, the pretty free use of purgatives is often of essential service, and may sometimes avert the necessity of the more potent and immediate depletive, blood-letting. Those of the saline order are most eligible when given with this view, as the various salts copiously remove the aqueous particles from the blood, and thus are retained its more vital properties, so necessary in the great process of assimilation ; hence the volume of

the vital fluid is reduced, and the oppressed action of the heart relieved, without so much reduction of the vital powers as results from the active use of the lancet.

When it is recollected that in the course of fever the secretions and excretions are not as normal,—that it is desirable to carry off the mucous accumulations from the digestive surface, where the effete matters so abundantly produced are liable in an increased degree to collect, and thus be followed by additional irritation on account of their being absorbed into the blood,—and that the peristaltic action of the bowels, from a loss of the organic nervous energy proper to their muscular coat, becomes impaired, the use of this description of remedies is at once apparent. Even in typhus cases the gentle action of the bowels should ever be strictly attended to, and kept regular by means of mild stimulative laxatives or enemata. The compound jalap powder,* in doses of a drachm, was very generally given, and with good effect,—it appearing a safe and mild purgative, which cleared out the large bowels of scybalæ which are there apt to collect; and Dr. Cormack also was of the same opinion, and says that he found this powder very safe where there was abdominal tenderness with strong pulse. The compound colocynth pill, with blue pill, was frequently given, and answered very well. Where a mere laxative was desired, the compound rhubarb pill, or three or four drachms of castor oil, were administered; as a common saline aperient, the ordinary cathartic infusion,† according to the formula of the hospital, was prescribed. In such cases, where the liver was not preternaturally stimulated to a redundant secretion of bile, five or six grains of calomel, or a dose of blue pill at bed-time, and a draught of the cathartic infusion, or a dose of castor oil on the following morning, effectually cleared out the bowels.

In some few cases of obstinate constipation, the croton oil, in doses of from one to two drops in a couple of drachms of the castor oil, was employed; but this remedy in fever is better dispensed with where that can be done with convenience, owing to its occasional tendency to produce irritation in the mucous lining of the bowels—a condition ever sedulously, if possible, to be avoided in fever, on account of there being such a predisposition to ulceration along the course of the digestive canal; a lesion to which the French pathologists ascribe all the phenomena of typhoid. The common domestic enema was often ordered, perhaps more commonly than could with convenience in private practice, such expedients being far more easily available in the wards of an hospital. Enemata are highly valuable, on account of the efficient manner in which they clear out the colon, and without being followed by that irritation which medicines at times produce. In order to ascertain when an

* Pharmacopœia Edin.

† With Senna, Super-Tart. Potash, etc., Pharm. Noscomii Regii Edinburgiensis.

enema was most indicated I usually had recourse to percussion by means of the pleximeter, as recommended by M. Piorry and several other authorities. When the sound was dull in the right iliac fossa it showed that the caput cæcum was distended; hence it was requisite to give medicines by the mouth; but if there was dullness in the left fossa, with resonance in the right, an enema of starch or oatmeal gruel was ordered, which answered in the most satisfactory manner. When the colon is loaded, purgatives by the mouth will not always empty that gut, and indurated fæces and other irritative matters can sometimes alone be removed by this means. Tympanitic distension was generally treated with enemata, composed of half a cupful of starch or common gruel, with six drachms or an ounce of the spirit of turpentine, or instead of the latter one to three drachms of the tincture of assafœtida, which were found signally beneficial.

(d) *Diaphoretics*.—Considering how important an organ the skin is in carrying off the exhalations from the body, the promotion of its sudatory functions is always to be wished for, because interruption of its natural action necessarily throws a greater stress upon the kidneys, and thus these organs being morbidly stimulated to excess of action, their positive lesion may hence be founded; besides, in health, the cutaneous exhalants expel from the body certain effete matters which cannot be retained without vitiating the blood, and thus disposing to organic disease. In relapsing fever it seemed desirable to induce sweating, because, as previously related, a copious sweat was one of the most manifest indications of the crisis, such appearing as the manner in which nature effected a resolution; and, as Sydenham has well observed, in the administration of our remedies we should give those which produce like effects to those efforts which are spontaneously produced in the body in the resolution of disease, or, in other words, we should copy nature. There has been a good deal of contention respecting the virtue of diaphoretics, some physicians highly extolling them, whilst others consider them of little more service than as placebos. The acetate liquor of ammonia, the compound powder of ipecacuanha, and James's powder, in conjunction with hot drinks, were very commonly given and found useful adjuvants; but to say more than this, that they produced any very decided or specific effects, would be affirming beyond what my own experience could substantiate. It is always important that fever patients should not consider themselves neglected, which they would most assuredly do, if without anything to take; besides, a periodical dose not only quiets the mind of the sick, but also ensures the proper attention of the nurse,—a consideration that obtains perhaps more in a public establishment, like an hospital, than with private individuals, with whom there is not that risk of their being neglected.

(e) *Diuretics*.—Respecting the evils resulting from a want of proper action in the kidneys some remarks have previously been offered. The frequent loss of functional power in the renal organs

in fever is a fact too well known to practical men to be especially insisted upon here. Considering, however, the mischief which is likely to accrue from the not unusual complication of nephritis or congestion of these organs, the physician is ever solicitous that the secretion be not only given off in full quantity, but of normal character, that is, possessing a due proportion of solid matters—which matters, from the excess of waste that there is in fever, are considerably increased, and if retained cannot fail to exert a deleterious influence. Again, the bladder, sphincter vesicæ, etc., from the morbid impressions made upon the nervous and organic nervous systems, often lose in some degree their proper functions, and hence retention of the secretion and its partial absorption; therefore we cannot be too careful in our investigations respecting the voiding of the urine and its natural characteristics. In the epidemic, the nitrate of potash, in conjunction with the carbonate of soda, or the liquor of potash and a little of the tincture of henbane, given every two or three hours, seldom failed to produce copious micturition. The common spirits of nitric ether, or neutral salts, also answered the purpose. When the urine is acid, as it generally is in fever, it is advantageous to administer an alkali, and no drug seems to answer better than the liquor of potash, added to which may be given the compound tincture of opium or of henbane: on the whole, perhaps, the latter is preferable, on account of its having a less tendency to confine the bowels and affect the head. When there was much acute pain over the region of the kidneys, local or (if very acute) general blood-letting seemed highly conducive to the restoration of these organs to their natural functions, and in some cases hot applications, as fomentations, poultices, etc., to the lumbar region, were followed by happy effects. From the congested condition in which the kidneys were so often found on inspection, it is highly probable that if cupping and leeching the loins had been more frequently adopted than they were it might have been with advantage.

(f) *Mercurials*.—The employment of mercury in fever has, by various authorities of eminence, been much recommended, but whether it possess that great virtue which some have ascribed to it is very doubtful, and certainly the question is quite open to controversy. Its advocates contend that it stimulates the capillaries; and thus, upon the Cullenian theory, by overcoming their constriction tends to resolve the disease. Dr. Hamilton, of Lynn Regis, affirmed that small and oft-repeated doses of mercury and opium have the effect of equalizing the circulation, and thus preventing local congestion. When administered with a view to its alterative qualities there is one fact not unfrequently witnessed—viz. the difficulty that there is in affecting the mouth when the skin is hot and dry, and the pulse frequent, and certainly, if it be beneficial in fever, such does not become manifest until some degree of salivation is produced. When given as an alterative, whatever prepara-

tion of the mineral may be selected, opium should be administered along with it, and there are good reasons for believing that the beneficial results which follow are not wholly attributable to the mercury, but may be partly ascribed to the opium, as neither, given alone, answers so well: this opinion was held by Dr. Alison, whom I have repeatedly heard express it as his conviction. The soothing influence of calomel and opium lessens the nervous irritability, and thus the effect is extended to the circulation, which is rendered more tranquil and natural. The calomel or blue pill are of eminent service in emulging the liver, and stimulating the biliary apparatus to more energy of action, but when that viscus was so preternaturally stimulated as it was in relapsing fever, the exhibition of mercurials seemed contra-indicated. When employed as an alterative, the following form was very frequently used in the wards, viz. twelve grains of calomel, three of powdered opium, in conserve of roses for eight pills, one of which was taken every six hours, or three grains of blue pill with quarter grain doses of opium at the same periods. Small doses of the mercurial chalk powder, with rhubarb and soda, answered in promoting the secretions, and it may be added that these drugs are highly valuable in fever on account of their safety; the gentle action which they maintain in the canal, without being followed by irritation, and when there is tendency to ulceration in the mucous membrane I am convinced that this combination is particularly eligible. Blue pill and colocynth with hyoseyanus was efficacious, and, when not contra-indicated, three or four grains of calomel, followed by a dose of castor oil, was often used. Calomel, in conjunction with the gum camphor, as recommended by Copland, was, I believe, prescribed when there was sinking of the vital powers, but of this mode of treatment in the now described fever I cannot express much from personal experience. It is no doubt an excellent formula in truly typhus cases, and in that fever I have seen the mercury and camphor freely used. Mercury pushed to salivation has been considered as a prophylactic for fever—a doctrine exceedingly doubtful, and certainly not at all times borne out by facts, because individuals who have been under salivation for syphilis have been known to contract a fever.

(g) *Rubefacients, Blisters, etc.*—To excite the external vessels to an increase of action will, of course, on the principles of derivation, be likely to relieve the deeper-seated structures of their preternatural fulness; and thus it may be said that, by instituting a new affection, nature is allured from that which had morbidly preceded. In some instances, where there is much irritability in the system, the application of any irritative agent, instead of being followed by any marked benefit, is only productive of further disturbance; this, however, is not very common (except in the very young), and where such remedies as blood-letting or other depletants have been employed. When the high temperature and quick pulse are on the decline, and nature rather requires stimulation, it is at such stage

that this order of remedies is indicated and found of service. Hot applications, as dry flannels, heated bran and salt, flannels wrung out in hot water, and applied to the painful part, were often used; and after fomentation had been employed, sprinkling the flannel with spirits of turpentine was not unfrequently succeeded by great relief. It may here be observed, that I have always known wet or moist applications far more effective than dry; perhaps the heat is more intimately brought in contact with the surface, or that the relaxation is more favoured by the absorption of aqueous particles into the capillaries, which thus dilate their contents, tend to overcome their constriction, and promote their circulation. Many times, in cases of spasm, I have known hot bran, hot salt, etc., of little service, whilst, on the contrary, efficient fomentation has immediately produced signal benefit. Sinapisms to the epigastrium, hypochondria, hypogastria, etc., were had recourse to often with advantage. Croton oil rubbed over the stomach, hypochondria, etc., night and morning, until an eruption appeared, which, by acting as a mild and continuous blister, was of great utility. The common fly blister was extensively ordered to different parts; and in many instances of cephalic affection, sometimes where there were subsultus and other unwelcome symptoms, a large blister to the vertex was very advantageous, and procured much benefit.

(h) *Medicines Employed in the Prevention of Vomiting.*—The reader may perhaps remember that sickness and vomiting were, during the first days of the febrile paroxysm, frequent symptoms, and sometimes so persistent as to be quite distressing to the patient. The effervescent powder, in milder cases, was prescribed, and found of service. One or two grains of powdered opium produced relief when the affection was very urgent and long-continued. Creasote, in doses of four or five drops in a little water, or syrup and water, had the best effects, occasionally removing the symptom at once. Prussic acid, in one or two drop doses, administered in a little of the solution of gum arabic, syrup, or other bland liquid, answered very well. When the vomited matters were very bilious, and unaccompanied by pain and tenderness in the hypochondria and epigastrium, a few grains of calomel, followed by a dose of castor oil, rhubarb, or the cathartic infusion, would arrest the affection. The most beneficial remedy was one used by Dr. Alison, and which I saw in numberless cases employed with essential service during the time that I had the care of that gentleman's patients in the clinical wards: this was from forty to sixty drops of the solution of morphia in two or three ounces of starch gruel, given as an enema; in fact, the prescription seldom failed in producing an immediate and beneficial effect. There is, as previously observed, an advantage in administering medicines by the rectum, and especially in a case like that of distressing sickness, when the mucous membrane of the stomach has become so morbidly irritable as to reject the most simple matters, and much more so those of a medicinal nature. Impres-

sions produced at either extremity of the intestinal canal are readily transmitted throughout its entire course, owing to the continuity of tissue and the interlacement of nervous filaments; and thus it is that a sedative being applied at the inferior extremity of the digestive surface, would be communicated to its distal parts. Again, the intense irritability of the *prima viæ* might prevent the absorption of agents submitted to their surface, and thus the system be more tardily brought under their influence. This, however, was a method that might, in like instances, be safely tried, and with much surety of being followed by manifest advantage. Hot cloths, cupping, leeches, sinapisms, fomentations, blisters, etc., were also at times employed.

(i) *Astringents*.—These remedies were of course occasionally demanded. When diarrhœa seemed dependent upon the irritative properties of the bile, a secretion, it must be recollected, very often given off in a morbidly increased manner, the compound chalk mixture, as also the compound chalk powder with opium, were of much service. When dysenteric symptoms were manifest, the superacetate of lead, in the form of mixture or pill, or small and oft-repeated doses of calomel and opium, were prescribed. Catechu and kino were employed with advantage. Enemata with laudanum also were ordered. In some cases, where there was increased secretion of the bronchial tubes, the preparations of squill and acetate of lead answered the desired purpose. In certain instances, where there was copious and continued sweating, with a laxity of the skin, the aromatic or diluted sulphuric acid, in doses of from ten to twenty drops, had the power of astringing the cutaneous exhalants; and if griping was produced, the addition of the compound tincture of opium or henbane checked such tendency.

(j) *Tonics*.—During convalescence tonics were highly valuable in promoting the restoration of health; in a debilitating disease like fever, the digestive organs become so weakened, as to be long unequal to their proper functions; hence such medicines are of essential service. The infusions of gentian, calumba, and cascarilla; the mineral acids along with a little of the syrup of ginger or orange peel; the sulphate of quinine in mixture with the diluted sulphuric acid or in pill with the extract of gentian or camomile, all had satisfactory effects. In cases of hepatic affection, the nitro-muriatic acid was valuable. The preparations of iron, as the sulphate, tincture, etc., in conjunction with some convenient adjunct, were prescribed. During the intermissions of the fever I tried if the use of quinine would prevent the recurrence of the relapses, but without arriving at any decisive conclusion; such experiments of course being prompted by the anomalous fever presenting certain though ill-defined characteristics of the intermittent type.

(k) *Stimulants*.—All descriptions of wines, spirits, and malt liquors, were at times given; but those most frequently in use were port-wine, porter, whiskey, and ale. When a powerful stimulant

was indicated, hot whiskey and water was ordered, because it possesses all the stimulative qualities of brandy, and, especially in Scotland, is much cheaper. Port-wine was extensively used, and with much benefit. Often have I seen the tongue coated, and the patient remain *in statu quo*, when four, six, or eight ounces of wine daily have produced the most marked results, the organ becoming cleaner, the skin softer, the pulse slower and more natural, and the general strength improved: in fine, the patient has then rapidly recovered. It must be remembered, however, that from the statistics which have been given, a great majority of the patients who sought admittance into the Edinburgh hospitals were the squalid and often half-fed inhabitants of the courts and wynds of the Old Town, whose pale visages and delicate frames contrastedly differed from the rural poor; and this fact was quite in accordance with the prevalent notions that patients in urban communities will ever, *cæteris paribus*, need a more stimulative mode of treatment than those from country districts; but independent of this, the type of the fever demanded a more stimulative class of remedies than epidemics which had occurred some years ago,—a statement not only borne out by comparing the present forms of fever with the sthenic types that used to occur, but by the testimony of those physicians who have witnessed many visitations of fever. I was informed that, many years back, the late Dr. Gregory, at the request of the Board of Managers of the Edinburgh hospitals, with a laudable view to economy, was induced to ascertain if whiskey and water would not equally supply the place of the more expensive port-wine. Dr. Gregory, after an ample trial, came to the conclusion that whiskey would not answer so well as wine. There is some difficulty, after a few doses, in prevailing upon the patients to persevere in taking the spirit and water, a circumstance which does not in like manner obtain with the wine; besides, the latter is by far more grateful to the capricious palate, is not so liable to disorder the stomach, and appears better calculated to insure the effect desired. During convalescence wine and porter were often ordered as tonics, and with much advantage, especially in the instance of confirmed tipplers, who improved much more rapidly under a moderate allowance of their wonted stimulus. Porter, by containing a grateful bitter, and not possessing so much saccharine matter as ale, was more extensively used; besides, it was less liable to produce disorder in the stomach and bowels. In private practice the bitter ale or the Indian beer is, on this account, very eligible. In Table No. VI. it is seen that out of 450 patients, 123, being 1 in 3·65, or 1 in $3\frac{1}{2}$, or 2 cases out of 7, required wine, and 37, or 1 in 12, had spirits. In Table No. VIII., out of 80 cases, 10, or 1 in 8, had wine; 8, or 1 in 10, spirits; and 10, or 1 in 8, ale or porter;—hence, out of 530 cases, 1 in 2·81, or nearly 1 in 3, required stimulants, and, as many were allowed stimulants after they were removed to the convalescent wards, the average might be stated as still higher.

(*l*) *Drinks*.—So long as the febrile paroxysm continued, the patients were, as might have been anticipated, craving for drinks; but as the temperature of the body was often so very high, the thirst was perhaps more urgent than usual. It is always desirable to allow, if possible, such beverages which, if taken in large quantities, might not disorder the stomach and bowels. Toast-water, barley-water, cold gruel, tea, the mineral and vegetable acid drinks made according to the formulæ of the hospital, were generally used. Dr. Cormack gave some of his patients, when the thirst was very great, the crystals of citric acid to suck, which considerably lessened the desire for liquids. Patients in the higher ranks of society can, of course, be allowed many other descriptions of beverage which can be taken with safety, and have the advantage of being pleasant to the taste, as lemonade, iced waters, orange water, etc., which, as the reader is aware, in public institutions, are, on account of the expense, beyond the reach of the inmates. On the whole, it is desirable that the patient should not drink too copiously, less disorder in the stomach and bowels should ensue.

(*m*) *Diets*.—With respect to the diets, these were of course altered according to the state of the fever, its duration, degree of intensity, and complication. In the time of the febrile paroxysm, a non-stimulating diet was ordered, and improved as soon as that could be done with safety. When the patient became convalescent, soups, strong broths, animal food, etc., were allowed. It is always incumbent on the part of the physician to be particularly solicitous respecting the food given to fever patients, as there is no doubt whatever that the most serious, nay fatal terminations, result from being too venturesome in permitting them to return to the stronger and more indigestible kinds of food. In cases of typhus and typhoid I have repeatedly known aggravations of the disease resulting from this error, and in some instances death was traceable to such cause.

(*n*) *The Application of Cold*.—Before concluding these observations on the curative measures adopted in the distemper, the use of cold applications may be briefly adverted to. The late Dr. Currie, as the reader is doubtless aware, has been one of the most strenuous advocates of this method; and there is no doubt, when used according to proper precautionary rules, it is highly to be commended. Its indiscriminate employment would be exceedingly injurious, nor could it fail to be at times productive of the most serious consequences. When the temperature of the body is very high, when the pulse is full, quick, and bounding, the patient restless, and the skin feels hot and tingling to the touch, sponging with tepid or cold water is generally followed by much benefit, and the patient becomes so cool and comfortable as to frequently fall over into a tranquil and continuous sleep, from which he wakes composed and refreshed: this was often the case in the epidemic. In the employment of this remedy the feelings of the patient will ever be our best

guide, and if it be grateful, it may with great hope of benefit be used; but if on the contrary, and he afterwards feels chilly, has headache, and small pulse, we may rely upon it that the measure would have been better omitted. It is at an early period of the disease when cold seems to be most indicated; during the stage of reaction, when there is high vascular excitement, and consequently a preternatural degree of animal heat, it then will seldom do harm, but rather be followed by benefit. In some instances in which there was much cerebral affection, pouring a continuous stream of cold water over the shaven scalp was productive of much advantage. Dr. Hughes Bennett informed me that the douche was very commonly employed in the Continental hospitals, especially in the Hôtel-Dieu, La Charité, and at Vienna and Heidelberg, of which he could speak from personal observation.

Such is a brief enumeration of the chief measures adopted in the treatment of this epidemic; and in this detail it has been endeavoured to generalize from the practice of the several physicians who had the charge of the patients in the various establishments, rather than to give the isolated treatment of one individual; and in thus presenting this general view of the curative means, it would of course have been impossible, without prolixity, to embrace all considerations associated with this particular part of the subject. It is, I am aware, the fashion in these days to imitate the now too prevalent custom of the continental physicians, who well-nigh concentrate the whole of their attention to the study of the pathology, and the morbid appearances discoverable after death, rather than to therapeutical researches. It is true that, after having gained a correct knowledge of a disease, the main difficulty is overcome; and it is equally true that such acquired knowledge is only useful so far as it can be brought to bear in the prevention or cure. In the treatment of this disease, as in all others, no trite and undeviating rules can be laid down, and much must ever necessarily be left to the discretionary powers and common-sense conclusions of the practitioner; and it must also be confessed that, in our treatment of this affection, measures prompted by the deduction of theory and defined speculations do not always appear as efficient and correct, whilst facts often force themselves upon the mind exemplifying the wonderful efforts of nature alone, convincing us of the potency of her own powers in the restoration of normal action, or, in other words, in the re-establishment of lost health. Where she seems unable to follow out her own salutary course of procedure, it is ours to narrowly observe in what these means consist, the manner in which she appears to accomplish her ends, to remove such obstacles as obstruct her course, and, copying her efforts, tender that assistance of agents which science has discovered, observation led to employ, and the long course of human experience taught as the best to be administered.

VI.—CONCLUSIVE REMARKS.

Previous to the termination of this article, there are some considerations, perhaps, to which a brief advertence might not inappropriately be made. From what has been said in the foregoing pages, it must be granted, on the part of the reader, that the affection which it has been attempted to describe possessed characteristics of a truly novel description; and those distinguishing features were such as to render it positively unlike any epidemic that has hitherto prevailed in these islands. The mode of invasion,—the kind of *maeulæ*,—the great proportion of jaundiced cases; the well-nigh, if not invariable, occurrence of relapse; the unusually quick pulse, unaccompanied with a commensurate degree of severity of other symptoms, as observed in forms of fever with which we are more familiar; the constant abortions or premature deliveries which it produced in pregnant women; the spontaneous resolution at an early period effected by a powerful diaphoresis, which fully and unequivocally, in a short space of time, terminated the febrile paroxysm; together with other peculiarities previously mentioned, showed the distemper to be anomalous, and without precedent. Conceding, then, that it did in its manifest characteristics broadly differ from the affections commonly termed typhus and enteric fever, it follows also, as a rational inference, that the first causes must also have essentially varied, or, in other words, that these forms were produced from poisons possessing dissimilar and distinctive qualities, because, as remarked, their cognizable effects were unlike. And it is from the effects alone that we are enabled to judge of many natural agents, and much more so, when such agents are of so subtle a nature as to elude the acutest and most refined modes of inquiry as to their ultimate properties; and because the system, after having passed through this fever, was quite as susceptible of contracting the ordinary typhus. Almost all agree that the poisons giving rise to the exanthems could never, under any modification of external influences or personal peculiarities, produce typhus, and *vice versâ*. It is true that a case of malignant small-pox may assume a typhoid form,—at least, a state which nosologists please to designate under that appellation (by way of perspicuity, and in order to obviate misconceptions, the condition now spoken of might more happily be recognised under some other term; for the want of succinct and clear definitions in medical phraseology, by confusing the meanings intended to be conveyed, is not only in itself an evil, but may cause a greater error in practice),—yet such would not be idiopathic typhus, because the phlegmasiæ will occasionally run on to the same state, and because the poison, if contracted, would not give rise to typhus, but variolous fever. A patient very recently came under the writer's notice who had scarlatina, and during convalescence became exposed to the infection of typhus, which she contracted, and passed through

the course of that disease in its ordinary form, as if the one affection produced its phenomena in the system quite irrespective of the other. Some author of eminence, when discussing this point, and contending for the oneness of cause of all denominations of fever, asserts that he has known an exanthematic fever produce typhus. An isolated case is quite insufficient to form the basis of a doctrine so important; and it is highly probable that in this single instance there were means whereby the true typhus poison might be communicated, although they were not discovered; and it is much more conclusive as to the truth of the opposite doctrine, when innumerable cases might be cited in its support.

Those authors who have contested for the fundamental identity of all descriptions of fever—that is, of their origin from one poison—have done so rather by rearing their theories on hypothetical assertions, than founding their doctrines on the unassailable basis of facts. It is this kind of argumentation which impedes the progress of science, by encumbering its path with vague and speculative notions, instead of rigidly appealing to facts, and taking the data of impartial observation for our guide. External influences, and the idiosyncrasies of the patient, it is true, will always cause some degree of modification; they may exert an influence on the development of symptoms, and predispose to this or that complication; but they cannot alter the essential nature of the disease; and, when a generalization is made from a considerable number of cases of fever, it will always be found that there are cardinal and characteristic symptoms distinguishing the type of the fever, however sometimes masked or rendered apparently different, from the operation of such influences, and particular conditions of the body. It would be exceedingly difficult—nay, impossible—to construct a nosological nomenclature to embrace all hues and degrees which, under varied circumstances, diseases are liable to assume; and therefore the classifications of disease particularly apply to general facts, comprehending the most marked and representative symptoms. Cullen erred by endeavouring too much at minuteness and perfection in his system, and sometimes by making facts bend to his preconceived theories. Gregory, Bateman, Perceval, Armstrong, and others, have objected to this great nosologist's subdivision of continued fevers, from the conviction that they are not met with in distinctive forms; and the former asserted that, during an extensive practice of thirty years, he never met with a pure case of synocha,—a statement, however, which was perhaps going too far, as we do occasionally meet with affections of a febrile character bearing a very near, if not a positive, resemblance to the species of fever enumerated under that head by Cullen, and which that great observer must have taken as his standard.

By the general acceptance of the term typhus, we recognise a disease which manifests as a predominant feature debility, accompanied by considerable impairment of the sensorial functions,

vitiation of the secretions, and rapid diminution of the solids; hence, to designate fevers of a simple and uncomplicated form by that more grave appellation, would not only be a nosological inconsistency, but calculated to lead to mischievous results. Some physicians have believed that the only real difference in fevers of the continued form is in the degree of intensity of their symptoms,—a doctrine which, if reflected upon, is untenable, because some fevers run a mild course throughout the period of the epidemic visitation, with scarcely any tendency to institute inflammatory complications, whilst in another visitation the type may be far more malignant, and local affections exceedingly common, doubtless depending upon the essential qualities of the specific poison, because one set of organs may at one time be little, if at all, affected, which at another will be almost invariably diseased, and because the many facts given during the time of the relapsing fever, and which have been detailed in this account, incontrovertibly give proof of the contrary. Throughout the interminable field of nature we see variation to infinitude, different laws, contrivances, and constructions,—differences in the adaptation of means to ends,—differences that point out the most obvious distinctions; nor can it be matter of surprise that there are differences in disease,—that affections may, superficially reviewed, resemble one another, yet be radically dissimilar, and that the causes be as various as the symptoms disagree.

In the fever now treated of, although it was of the continued kind, it could not with correctness be said that its characteristic diagnostic marks placed it under the class of synochus or enteric or typhus, nor did it coincide with our notions of synocha. What, it might be asked, could be more conclusive of the *ex prima causa* disagreement of the two forms of fever now spoken of—viz. the common typhus and the relapsing fever, than that within a short space of time, occasionally even during convalescence, of the one succeeding the other; both forms existing simultaneously in the same locality,—nay, in the same house, and the same family,—that the most obvious and distinctive characters broadly distinguished them, never rendering it a matter of doubt as to their identity, that they never became inextricably blended, that even nurses and non-professional people could often say which was a case of short fever, and which was typhus, and that most, if not all, of those cardinal symptoms by which nosologists designate typhus, were wanting in the new distemper, and unequivocally apparent in the disease with which we are more familiar? It has generally been regarded as, and appears to be, a law in the animal economy, that external agents which, when first taken into the system, produce considerable effect, lose their power by repetition, either by the system, after having been prematurely excited by such agents, becoming less susceptible of their power, or by better accommodating itself to those agents—a fact which we know to be substantiated by

the exhibition of medicines; and thus it is with regard to the specific poisons giving rise to the various forms of febrile diseases; after having exerted their power, the body, for a shorter or longer period, has little or no tendency to receive the agent, or re-institute that morbid action which constitutes its repellent efforts: in typhus the immunity is considered to last for several weeks or months; in the exanthems during the remainder of life. It is undoubtedly on this general principle that vaccination renders milder or averts a disease which, if it be not identical, may be presumed as very analogous.

If the nosological classifications of diseases could be founded more upon the radical pathology than they have hitherto been, or, in other words, were the classes arranged more with reference to the causes of symptoms than the symptoms themselves, the conclusions would, in a theoretical point of view, be more philosophical, and in practice more certain and correct; but, as previously remarked, it is the want of this precise information which has given rise to many apparent and real discrepancies amidst those who are accounted standard authorities. When we see certain organs the seat of lesion in one febrile attack affected, in another scarcely or not at all complicated, when the pathological distinctions during the progress of the malady differ, we of course conclude that their causes must vary. Visceral complications in typhus some have endeavoured to account for as mainly dependent upon casual circumstances, and there is little doubt that previous disease in an organ or organs would, under the general disturbance of fever—which, it must be remembered, powerfully predisposes to the inflammatory state—have a great proclivity to assume true inflammation; but when a general review is taken of hundreds of cases, and a common proneness is observed towards the development of peculiar or particular symptoms, we are obliged to attribute such to qualities in the essence of the fevers, and thus admit that their first causes may be unlike. It might be advanced that two attacks of acknowledged typhus may present so much apparent diversity in their symptoms—not merely in degree of intensity of such symptoms, but as if in their ultimate nature—as to appear positively diverse, yet upon a careful summing up of facts, there would be certain residuary symptoms arguing unanswerably as to the oneness of their cause, and assuring as to their real identity; in other forms of disease the degrees of intensity of symptoms would almost impress us with a belief of their being two and opposite diseases—that is, if superficially considered. In recapitulation of what has been said, and in order to supply certain facts corroborative of the doctrine maintained, the following propositions may be advanced, viz.:—1st, *What were the proofs supplied by this epidemic that all varieties of fever do not proceed from one cause, but are produced by different specific poisons?* 2ndly, *What were the distinguishing diversities between the epidemic and typhus?*

1. Bateman, Southwood Smith, Marsh, and others, as well as the Brunonians, contend for the identity of cause of all denominations of fever, but without supplying sufficient data to give irrefragable testimony to their doctrine. To accede to the position maintained by these authors would be inconsistent with what we know of innumerable authenticated facts. Previous to the occurrence of the epidemic which has formed the subject of this article, there was perhaps more room for disputation relative to the question, it must be allowed; but since that febrile attack the point appears conclusive, and whatever other practical information may have been gained by those who studied the phenomena of that fever, it seemed undeniable that continued fevers are not identical in their essence, that is that they have their origins in different causes, or specific poisons. It is no more inconsistent to think that there are various specific poisons giving rise to diverse forms of continued fever, than that the poisons producing these, and those causing the exanthems, should be different, and it has only been from the want of conclusive evidence to establish the doctrine of non-identity that the hitherto most generally received etiological reasonings have been erroneous. If fevers proceeded from one poison, the dissimilarity of types, often constituting important pathological features, would be difficult to account for, on the notion of extraneous influences; there would be more sameness in their phenomena, nor would the often oppositeness of characters be so apparent. When small-pox, scarlatina, or measles prevails epidemically, cases of typhus are then more rare, or wholly absent; and, *vice versâ*, one or other of these distempers may prevail, decline, and be succeeded by another, but they seldom, in the same locality, rage simultaneously; as if it were a law amongst infectious diseases that only one should occupy the field at a time. During the height of the epidemic visitation there were scarcely any cases of typhus in the wards of the Edinburgh and Glasgow hospitals, whilst small-pox, scarlet fever, etc., were well-nigh entirely absent, fully maintaining the assertions now advanced. As the relapsing fever declined, typhus increased. In January, 1844, out of 450 cases of fever in the Edinburgh hospitals, there were only 24, or 1 in 18·75 of typhus, but about four months later, when the epidemic fever was on the decline, the proportion of typhus cases was far greater, for, as seen by the following table, out of 159 cases of fever, then in the various establishments, 65 of that number were undisputed typhus, being 1 in 2·44 instead of 1 in 18 $\frac{3}{4}$; and on the 1st of June the total of epidemic cases had decreased to 33, whilst the typhus cases were 59; thus the latter being almost double the former.

Males	.	.	.	.	.	.	.	68
Females	.	.	†	.	.	.	.	91

Total 159

TABLE No. IX.

This table shows the exact number of epidemic and typhus cases in the various establishments on the 15th of April, 1844; also the number and manner in which the two forms of fever succeeded each other.

IN THE VARIOUS WARDS OF THE EDINBURGH ROYAL INFIRMARY.

Wards.	Males.	Females.	Typhus.	Epidemic.	Epidemic Cases succeeded by Typhus.	Typhus Cases succeeded by Epidemic.
No. 2	Males	—	8	7	2	—
" 3	"	—	6	9	1	1
" 5	"	—	1	10	—	—
" 7	—	Females	—	10	—	—
" 8	Males	—	—	5	—	—
" 9	—	—	2	—	—	—
" 12	—	Females	6	7	1	—
" 16	—	"	8	5	2	1
Fever-house A. Wards.						
IN THE EXTRA FEVER HOSPITALS.						
No. 1	Males	—	3	4	—	—
" 2	"	—	8	5	—	—
" 3	—	Females	1	1	—	—
" 4	—	"	2	4	1	—
Fever-house D	—	"	20	27	5	2
			65	94	12	4

Out of the number of patients given in this table it is seen that in 12 instances the epidemic had been succeeded by typhus, and four of typhus succeeded by the epidemic. Dr. Henderson became fully convinced of the non-identity of the forms, and paid special attention to the investigation of this interesting point. From February to September he saw but 39 cases of typhus; the histories of 29 of which were carefully taken, and in four only out of the whole number was there any doubt as to the infection being derived from patients having the relapsing fever. Upon full inquiry relative to these four doubtful cases, it was proved that previous to their illness they had been where the measly typhus prevailed, or there were such circumstances connected with their previous history as to render it probable that they might have contracted the disease. One instance, and which Dr. Henderson quotes, I well remember, which was in the person of a night-nurse who came from the country, and acted in that capacity in Ward No. 13, in which there were no patients except those labouring under the epidemic. This woman, however, took typhus, a circumstance which at first seemed to militate against the notions of essential dissimilarity which, amongst certain parties, were now entertained. Upon inquiry it was discovered that a short time before becoming indisposed she had washed the linen of a patient belonging to another ward, who had died of malignant typhus, and thus the apparent anomaly was satisfactorily explained away. The remaining three cases were also fully accounted for. There was one

family the members of which had both fevers ; and as this illustration forms one of the best examples of what it is now endeavoured to prove, the particulars may here be concisely detailed. This was in the family of a Joseph Dempster, 32, College Wynd, Edinburgh.

1. Ann Dempster (daughter), æt. 14, began in epidemic December 13th, and was dismissed 26th ; April 20th, admitted with typhus and dismissed May 15th.

2. Joseph Dempster (father), æt. 52, began December 27th, 1843, with epidemic ; dismissed at the end of three weeks, remained out six days, when he relapsed, was re-admitted, and at the expiration of other three weeks was finally discharged. April 28th, was again admitted with exanthematic typhus, and dismissed May 17th.

3. Jane Dempster (wife), began in epidemic January 2nd, discharged on 27th, remained out three days, was re-admitted with typhus, and finally dismissed March 31st.

4. Elizabeth Dempster (daughter), æt. 23, had epidemic in January ; remained in hospital three weeks.

5. Jane Dempster (daughter), æt. 7, admitted with epidemic January 7th, dismissed the 23rd. March 10th again admitted, having now typhus ; discharged April 8th.

6. Joseph Dempster (son), æt. 18, admitted with epidemic January 20th, and remained in hospital five weeks.

7. James Dempster (son), æt. 8, admitted in epidemic February 12th, discharged March 10th ; re-admitted April 24th with typhus, and discharged May 14th.

8. Maxwell Dempster (son), æt. 3, had epidemic in February ; April 16th, commenced in typhus, from which he became convalescent after three weeks.

Referring to the above, it will be seen that each of the individuals had the epidemic, and that six out of the eight had typhus. The longest period of intervention (in the instance of Ann Dempster) was seventeen weeks ; in the case of Jane Dempster (the mother) but three days. In order to have more extensive data on this point the annexed table was compiled.

From Table No. X. the following particulars are deducible, viz. :—

1 case where typhus manifested itself within 1 month.	
6 cases	2 months.
10	3 „
4	4 „
3	5 „
2	6 „
1 case	7 „
4 cases	9 „
1 case	10 „

TABLE NO. X.

Which shows how the fevers succeeded each other in a short space of time.

No.	Name.	Age.	Male.	Female.	Date of attack of Epidemic.	Period of intervention between the two attacks.		Date of attack of Typhus.
						Weeks.	Days.	
1	A. D.	14		Female	Dec. 13, 1843	18	3	April 20, 1844
*2	J. D.	2	Male		Jan. 23, 1844	13	5	" 28, "
3	J. D.	48		Female	" 2, "	4		Jan. 30, "
4	T. D.	7		"	" 7, "	9		March 10, "
5	J. D.	8	Male		Feb. 12, "	10	2	April 24, "
6	M. D.	3		"	" 4, "	10	2	" 16, "
7	A. W.	28		Female	March 6, "	8	5	May 6, "
8	J. W.	45	Male		Feb. 1, "	9	3	April 7, "
9	E. M.	22		Female	March 16, "	9	4	May 22, "
10	M. H.	25		"	Nov. 4, 1843	7	5	Dec. 28, 1843
11	J. A.	20		"	" 10, "	24	1	April 26, 1844
12	A. M.	16		"	Dec. 20, "	17	2	" 29, "
†13	J. F.	44		"	Feb. 1, 1844			
‡14	E. F.	23		"	April 13, "	5	2	May 20, "
15	J. F.	32		"	Feb. 20, "	5	2	March 28, "
§16	E. M.	32		"	" 10, "	5	1	" 16, "
17	C. D.	31		"	" 1, "	9	3	April 17, "
18	M. J.	4		"	Jan. 24, "	15		May 8, "
19	E. C.	10		"	" 16, "	10	2	March 28, "
20	J. D.	27		"	Sept. 10, 1843	34	1	May 6, "
21	T. K.	13		"	Feb. 7, 1844	12	2	" 3, "
22	M. R.	17		"	Aug. 11, 1843	38	1	" 4, "
23	H. M.		Male		Nov. 17, "	20	5	April 10, "
24	H. W.	20		Female	Feb. 6, 1844	16		May 28, "
25	H. D.	6		"	Oct. 11, 1843	32	3	" 25, "
26	D. N.	18	Male		March 3, 1844	9	3	" 18, "
27	M. D.			Female	" 17, "	11	5	June 7, "
28	M. C.	29		"	Jan. 10, "	19	2	" 13, "
29	G. B.	28		"	Oct. 9, 1843	32	3	May 23, "
30	J. D.	21		"	April 1, 1844	7	3	" 23, "
31	H. W.			"	Dec. 25, 1843	22	6	" 23, "
32	M. G.	10		"	Oct. 3, "	34		" 28, "

This table, which gives the exact dates respecting the time of attack, period of intervention, etc., of thirty-two cases, proves that such was not merely a casual occurrence; and if it had been deemed requisite, a far greater number, in illustration of this fact, could have been supplied. At the expiration of eight or ten weeks seemed to be the time that patients who had passed through the epidemic were most liable to manifest typhus. Whatever may be the arguments adopted by Bateman, Southwood Smith, and others, who contend for the oneness of cause of all denominations of fever, the facts now advanced may, perhaps, in some measure, invalidate,

* This patient was twice admitted into the Hospital with distinct attacks of the epidemic previous to her having the typhus.

† Began in typhus before leaving the wards.

‡ Began in typhus before leaving the wards.

§ Began in typhus before leaving the wards.

because the two diseases were never inextricably blended—because they were found in the same stair, the same house, and the same room—because the infection caught from patients ill of one description of fever was never proved to produce the other, whilst like produced like in multitudes of instances—because typhus fever never attacks one individual in so short a space of time—because the precedence and succession of the two forms is, reasoning from what is acknowledged relative to the distinctions of the exanthems and continued fever, a most powerful, and, indeed, an incontrovertible argument, that the two diseases are essentially dissimilar, and because, as observed when the cardinal symptoms are of an opposite nature, the pathological characteristics markedly distinct, we cannot but conclude that the causes giving rise to such effects also vary. The following is a case in point, and one in which typhus preceded instead of succeeded.

CASE XVI.—*Typhus succeeded (before leaving the wards) by the epidemic, of which the patient had three distinct attacks, before dismissal from the hospital.*

James Paterson, æt. 24, a baker out of employment, but not in want; moderately robust; is fully enabled to give a clear account of his illness, and was brought into the hospital by the police yesterday (Dec. 30th.)

Dec. 31st.—Is talkative and incoherent, but occasionally gives correct answers when put to him; no tendency to stupor. The surface is thickly spotted with an eruption, especially over the trunk, hypochondria, and epigastrium. Pulse 138, soft, not feeble, and of moderate size. Tongue dry, but clean. Has had two stools; does not complain of any pain.

Habeat. Vin. Rub. ζ iv.

January 1st.—Passed a quiet night, and reported to have had a good deal of sleep in the morning. Pulse 130; eruption much as before; tongue soft and moist; pupils of good size; thinks himself better; bowels open.

2nd.—Eruption considerably faded; pulse 128, of good strength; much delirium during the night.

3rd.—Has had no sleep during the night; has been constantly endeavouring to get out of bed, or be sitting up. Pulse 134; is stupid and obstinate, and will not answer questions when spoken to; pupils large; bowels slow; eruption nearly gone.

R Sol. Mur. Morph. ζ j.; Vini Antim. Tart. ζ j.; Aquæ Puræ, ζ ij. Miscæ ft. Mist. ejus. cap. quartam partem statim et repetatur omni quarta horâ. Enema domestica statim injiciatur.

4th.—Pulse 124; tongue moist and soft; skin soft; eruption gone; is more inclined to answer when addressed; bowels opened twice by injection; slept only two hours, and was in other respects much the same as during the previous night.

Habeat haust. h. s. c. Sol. Mur. Morph. gt. xx.

5th.—Slept well after twenty drops of morphia in addition to his ordinary dose. Pulse 130, of fair strength. Over the lower third, on the posterior aspect of the left lung, there is dulness on percussion, and on auscultation a crepitant râle is heard. Intelligence still confused; skin hot and moist; tongue clean and moist; eyes somewhat staring and expressive of anxiety.

R Pulv. Ant. Tart. gt. iij.; Aquæ ʒvj. Misce. ft. Mist. cap ʒss. q. q. q. horâ. Emp. vesicator. lateri sinistro applic.

6th.—Slept well, and had no nausea or vomiting from the medicine. Blister has risen well; pulse 116, soft, and of moderate volume; respiration 30 per minute; skin hot, and free from eruption; still stupid and incoherent; has had one stool; unusual resonance of voice continues on the posterior aspect of left lung.

7th.—Pulse 74, of good strength; coughs more; percussion still anormal at lower part of left lobe.

8th.—Pulse 70; respiration and percussion more natural; tongue moist and clean at apex and edges, and but little loaded on other parts; more intelligent, and slept well; no cough nor any other unfavourable symptom.

24th.—Continued to improve from the last report. For several days was walking about the ward, and yesterday while sitting at the fire was suddenly seized with a fit of shivering, and general and arthritic pains; was somewhat restless last night; to-day pulse 134, quick and soft; tongue white and loaded; bowels slow; complains of some pain in the head; expression somewhat confused, and appears as if startled and intimidated; skin hot and dry.

Habeat Infus. Cathart. statim.

25th.—Reported to have had considerable delirium during the night, having talked much but manifested no violence. Began to sweat about 11 o'clock to-day, and is now sweating very copiously. Pulse 180, pretty full; is at present incoherent, and is unable to answer questions; urine mixed with stools, and not seen.

Habeat Vini Rub. ʒiv.

26th.—It is not known how long he continued to sweat yesterday; skin hot and dry; pulse 120; urine passed to 16 oz. very thick and yellowish.

29th.—Sweated copiously during the night; pulse down to 80; skin cool.

Feb. 3rd.—Has continued to improve since last report; appetite good; tongue whitish but moist; pulse 80, soft and regular; sweats a little at night. Had castor oil yesterday, by which his bowels were opened four or five times; urine not kept, but is voided in moderate quantity, and deposits a copious pinkish sediment; does not feel any confusion of head, nor has any drowsiness.

4th.—Last night was seized with chilliness and rigors, which were followed by flushings of heat; slept but little; no delirium, nor any confusion of intellect; pulse to-day 116, quick; skin hot;

complains of slight frontal headache; tongue furred; bowels not opened since yesterday; urine passed to 36 ozs., of a light reddish-brown colour, no sediment. Takes his food without relish.

5th.—Slept pretty well last night; had some sweating; no wandering; to-day pulse 154, soft and small; tongue white; no appetite for food; bowels opened this morning; urine excreted to 36 ozs.; in other respects as yesterday; skin moist; answers questions intelligibly, and has no confusion of head.

7th.—Sweated a good deal the night before last; yesterday at visit his skin was cool and moist; pulse still frequent, but soft and regular; expression of countenance somewhat heavier than the day before; answers questions in a confused manner; no particular tendency to somnolency; urine all kept (16 oz.), sp. gr. 1026, with a copious pink sediment, disappearing on heating it gently near the point of ebullition; the urine becomes again slightly hazy, nor is the precipitation dissolved by the addition of nitric acid; bowels confined; tongue whitish.—To have a domestic injection immediately.

9th.—Sleep was somewhat disturbed last night with dreams, and talked a little in his sleep; had some sweating; to-day skin cool; pulse 100, regular; feels well in every respect; quantity of urine cannot be ascertained, having voided it along with his stools; red deposit remains; bowels opened three times from injection.

This man had another relapse before leaving the hospital, making the third distinct attack of the epidemic subsequent to having typhus.

REMARKS.—In the first day's report of this man (Dec. 31st) he is said to be talkative and incoherent; and it is stated that the surface is thickly studded with an efflorescent eruption. On the 3rd of January, 1844, it is seen that there had been considerable delirium; and from his obstinate taciturnity, it is obvious that his mental faculties were much impaired: and for other three or four days the intelligence was confused. On the 8th, being his tenth day in the hospital, was the time about which was the critical period: and if five or six days be allowed for illness previous to entering the institution (and such would be a fair estimate, as, in typhus, it was generally from four to six days before they came into the wards), the crisis would then be about the fifteenth or sixteenth day of the disease, and not on the seventh, as in the epidemic. Besides, we do not see that the transition from a febrile to a non-febrile state was so sudden and marked as in the epidemic, the change being far more gradual. From that time he steadily improved, and became so far recruited as to be enabled to walk about the ward. He was then again suddenly seized with shivering, and all the other premonitory symptoms of fever. At the expiration of five days, the febrile paroxysm was abruptly resolved by a copious diaphoresis. A non-febrile interval of six days ensued, when the accession of rigors, dry skin, heightened pulse, furred tongue, frontal headache, etc., demonstrated another repetition of the febrile

state; and this paroxysm continued for four or five days, and was in like manner resolved. A third attack, characterised by the same phenomena, supervened, and in a similar way spontaneously terminated. This case affords the most distinct and indisputable evidence that the two fevers were radically diverse. We never observe repetitions of typhus coming on in the manner described, as by rapidly passing through a succession of febrile and apyrexial states, the paroxysms being abruptly ended by a powerful sweat; whilst the exanthematic eruption, the longer continuance, the less observable critical period, the gradual declension, etc., of typhus, broadly characterise it from the relapsing fever.

From the particulars set forth in the preceding tables and case, it would be difficult to arrive at any other inference than that the two forms were in their fundamental qualities unlike; that is, if we judge of causes by effects; and unquestionably in this kind of inquiry we can only determine of the occult nature of the former by the more manifest and cognizable characteristics of the latter. We have seen that the epidemic fever for a long period prevailed to a considerable extent, and that during its prevalence other contagious diseases scarcely at all existed, being exactly in accordance with what has long been observed relative to this particular law in febrile affections,—that in the decline of the one description another set in, spreading in the same districts, the same houses, and amongst the same individuals,—that having passed through the one form was no preventive, but rather perhaps predisposed to the other; and that many other unequivocal proofs were obtainable of the opinion now endeavoured to be maintained. Two itinerant young Irishmen were reported to be ill in fever, and whom I visited. On examining those patients, I felt convinced that they had recently been at some large town where exanthematic typhus prevailed. On inquiry, it was ascertained that they had come from Liverpool, and that they had been exposed to the contagion of malignant typhus in a lodging-house: and thus the apparent exception was at once accounted for. There are no reasons for believing that the exanthematic eruption is the inseparable concomitant of a certain degree of malignancy. I have witnessed many of the very worst forms of the disease where the body has gone into the most putrescent state. Again, these young Irishmen, although they presented a well-marked eruption, had the distemper in a mild manner; hence, it is unavoidable to infer that the poisons giving rise to continued fever vary in their essential properties.

The few remarks to be offered under this proposition can best be answered by a brief recapitulation of foregoing statements. (a) Its accession was with greater suddenness than typhus; the latter generally coming on insidiously, whilst in the former scarcely any premonitory symptoms were given. (b) The rose-red efflorescence never occurred in one single instance amongst the twelve hundred cases which I personally examined of the relapsing fever

(which we know to be one of the most indisputable and distinctive diagnostic marks of real typhus), whilst in cases of acknowledged typhus, then in the wards, such was very commonly present; again, the livid petechiæ of the epidemic and the measly spots never simultaneously existed. (c) Copious diaphoresis invariably at an early period resolved the one, while it did not the other; or, when it did appear in typhus, it was the sure harbinger of unwelcome symptoms. (d) A considerable proportion of the epidemic cases became intensely jaundiced; in typhus, such but occasionally occurs. (e) In the one they invariably relapsed without any exciting cause, often to the second or third, and sometimes even to the fourth time; each successive attack being distinguished by a repetition of primary symptoms, and the whole train of phenomena, as observed in the first febrile paroxysms; whilst in the other, such returns are but an aggravation of existent symptoms, very generally traceable to, and always produced by, some excitant cause, and not spontaneous repetitions of the primary febrile state. (f) Not one single instance could be discovered in which a pregnant woman, labouring under the epidemic, did not abort, or was prematurely delivered; whilst pregnant females then in the wards, and affected with typhus, went through their natural period of gestation. (g) The mortality of typhus is generally twice or three times greater. (h) The rapidity of convalescence in the one was much greater than that of the other. In typhus, the patient gradually improves, and the febrile symptoms disappear by degrees, often consuming a third of the whole time of illness; in the epidemic a few hours, or even less, sufficed to effect a total and unequivocal cessation of the febrile state. Contrasting these particulars the one with the other, in conjunction with additional statements which have been advanced, we cannot but arrive at the conclusion before contended for, that they were not identical.

Throughout the entire period of the epidemic visitation the fever preserved an evenness of character, without manifesting any variation in its leading features. The following, and last case to be given, is one that was taken about the decline of the distemper.

CASE XVII.—*Showing that the epidemic was characterised by the same symptoms at its close as at the commencement.*

Andrew Goodall, a weaver, æt. 20, a native of Selkirk, where he was exposed to the contagious influence of the epidemic. First began to feel unwell on Friday morning last (May 31st), having then had shivering, which was followed by pain and dizziness in the head, aching of the limbs, weakness in the inferior extremities, and loss of appetite. He walked to Galashiels that day, and on his journey he bathed in the Tweed; after which he fancied he was better for a short time, but during the night the headache increased, had much perspiration, and did not get any sleep. On Saturday morning took some Epsom salts, which did not operate until evening: the head-

ache continued, and alternate chilliness and flushings were experienced through the night. On Sunday morning felt much pain in the chest upon taking a full inspiration; had much soreness over the body generally, but especially an aching pain over lumbar region; had frequent desire to void urine, which was passed in very limited quantity. He again passed a restless night, and perspired much. Continued the same yesterday, but slept better last night.

On admission (June 4th), complains of an indistinct dull pain in the head, with great giddiness upon standing up or raising himself in bed. On attempting to move feels much soreness, and a sense of aching weakness over small of back and in inferior extremities. Pain in chest is now very slight, and can take a full inspiration with little sense of pain or tightness. Bowels soluble; tongue moist and clean at edges and apex, but rather dry and a good deal furred in centre; no sickness or vomiting; skin hot and dry; pulse 100, of tolerable strength.

6th.—Perspired a good deal last night, and towards morning slept soundly for some hours; urine passed copiously; bowels open; tongue more natural.

7th.—Slept well; tongue moist; bowels open; urine voided normally; expresses himself as being better; skin cool and moist; pulse 58, of good strength.

8th.—Slept well last night; bowels open; tongue cleaner; pulse near the natural standard.

9th.—Continues to improve: ordered common diet.

11th.—Dismissed cured.

REMARKS.—It is almost superfluous to offer any observations on the above example. The initiatory symptoms, as compared with those of No. 1, were very similar. On the morning of the seventh day, the critical sweat supervened which effectually resolved the febrile paroxysm. He left the hospital after having been an inmate for a week, and although he had no return of the fever whilst in the institution, it is highly probable that he would have a relapse after dismissal, which was frequently the case when the patients were discharged early.

Such is the account which it has been endeavoured to give of the Scotch Epidemic Relapsing Fever of 1843-44, and I humbly think that the impartial reader must needs arrive at the conclusions which have been maintained in the foregoing pages—viz., that the leading and characteristic features of the distemper were peculiar and unexampled. Those, perhaps, whose experience has been more ample may find some points of objection; in the main, however, by rigidly adhering to facts, as noticed by constant personal observation, I trust that the views taken will not be deemed altogether incorrect. I have been more diffuse than might be desirable, but when it is considered what diversities of opinions there are, relating to many subjects connected with the disease, and how many considerations there are demanding some degree of attention, to be intelligibly concise is

more difficult than may be generally imagined. If the deductions which have been advanced do not coincide with the opinions of all, the data which were carefully amassed from many hundreds of cases cannot fail to be of value whatever theories are espoused or doctrines maintained, and thus in conclusion may be cited the words of Rousseau,—“I know that the truth is in the facts, and not in the mind which observes them.”

XIX.

SUBCLAVIAN ANEURISM.

THE example about to be given of this affection is of some pathological interest, insomuch as the necessary operation could not be carried out, and there was presented the opportunity of continually watching the enlargement, and noting its progress. The case occurred many years ago, in the person of a man aged sixty-five, whose occupation had been that of an agricultural labourer. When I first saw him he complained of what had been termed rheumatism of the right shoulder. He was ruddy, fresh-coloured, and healthy looking. The volume of flesh was good, and he was regularly pursuing his occupation. And it might be said, with the exception of this pain in the shoulder, he was in his usual good health. He had complained of this pain about the shoulder for many weeks, and had applied to one or two irregular practitioners, by whom he had been bled, blistered, and plastered, but without deriving any benefit. The right hand was slightly swollen; he complained of a sensation of numbness, and thought it was not so strong as the other. He also said that near to the collar bone was "a small lump which fluttered and beat," after which statement I at once discovered an aneurismal tumour, the nature of which enlargement, from the distinct pulsation, was readily recognized. It was about the size of the section of a Tangerine orange, and situated below the middle third of the clavicle. On a more careful examination, the anormal degree of pulsation extended farther than was at first anticipated, as the vessel could be felt beating powerfully until lost behind the sterno-clavicular articulation; fremitus very perceptible; the right carotid artery beat with far greater force than the left, and on applying the stethoscope to the tumour, a distinct bruit could be heard isochronous with the first sound. By precise admeasurement its size was as follows:—From superior margin of pulsatory motion passing downwards and over its contour, four inches; horizontally, and as before exactly following its configuration, three and a half inches; between the pulsating margin on the mesial side, and the sterno-clavicular articulation, was an indented-looking space measuring two inches. The clavicle could now be distinctly traced along the whole of its course; slight pulsating enlargement could be felt protruding upwards behind its

superior edge. In the morning, the pains in the shoulder and arms were said to be less urgent than at night, and he confidently asserted that on rising in the morning the enlargement was of less dimensions. He was now warned of the very serious nature of the disease, whilst rest and a complete cessation from all employment were strictly enjoined. The bowels were to be kept open by gentle laxatives, all stimulating liquors to be avoided, and a spare farinaceous diet to be taken. After the lapse of six weeks there was decided enlargement. At the end of three months the tumour had protruded upwards behind the clavicle, and could also be felt pulsating lower down the thorax; space between the inner edge of the tumour and sterno-clavicular articulation then nearly obliterated; pulsation forcible, and bruit as distinct as ever. On the 26th of June the tumour had become considerably larger; clavicle could not be traced further than about an inch from the sterno-clavicular articulation, where it then became lost in the swelling. Tumour measured nine inches from above downwards, and six inches transversely; presented three distinct elevations on its surface, which were divided by well defined fossæ, thus giving to its external configuration that of a tri-nodulated swelling. Has become thinner, and in the face looked somewhat bleached.

July 22nd.—Tumour much larger, and reported to have increased more than usual during recent week. Forearm of right side looked shrunk and wasted, and the skin was shrivelled; hand and fingers were swelled and turgid, and of a redder colour than natural. Complained of much pain in arm and shoulder; pulsation throughout entire surface of swelling distinct and powerful; bruit could still, though less audibly, be heard. Appetite good; bowels regular; radial pulse on affected side feeble.

On August 5th he said he had suffered considerably from pain in the arm and shoulder. Enlargement was pointing, and conical prominence converged towards the sterno-clavicular articulation. On the apex of this ill-defined conical eminence was a light brownish purple ecchymosed patch, clearly circumscribed, and about the size of a crown-piece, while the contour of shoulder and upper arm looked full, rounded, bright, and smooth, and on passing the hand over the surface of these parts, a feeling to the touch was given similar to that which is felt in a case of anasarca when the inferior extremities are in a state of considerable œdema. Colour throughout redder than natural, and on superior surface of shoulder it acquired a roseate tint. Hand and fingers, as before, swelled, and redder than common. Appetite pretty good; tongue moist and clean; bowels regular; pulse in left arm of ordinary frequency. Said that swelling has felt larger to-day than it ever did on any previous occasion. Radial pulse in affected arm could, with difficulty, be just distinguished. The tumour measured at this date, from the superior pulsating margin which extended to supra-spino-scapular regions in the anterior of the thorax, ten inches. In the transverse

direction it was eight inches, and from the sterno-clavicular articulation diagonally below the axilla it was eight inches.

On the 1st September he was entirely confined to bed. The tumour had assumed a more even rotundity; looked larger; intersecting fossæ and nodulated eminences were almost obliterated. Discolouration of integument had greatly increased, and this extended to several inches in circumference; it varied from a livid brown to a dark crimsonish rose hue. Whole of shoulder and upper arm had a very congested œdematous appearance; hand and fingers as before. On the superior-posterior aspect of shoulder, especially over the superior scapular region, the surface was irregularly risen in dark phlegmonous patches, from one to two lines in elevation, which were of a rose-red shining appearance. Not the least pulsation could be felt in the radial artery of diseased arm. Complained of very much pain in shoulder and arm. On manipulation, tegumentary covering of tumour felt thickened and indurated, and a feeling was imparted as if there were infiltration of serum in the subcutaneous cellular tissue. Pulsation less distinct to fingers, but clearly to be heard either by stethoscopic or mediate auscultation; pulsation could now be distinguished for twelve inches from above downwards, for ten inches transversely, and ten inches diagonally from sterno-clavicular articulation towards the inferior part of the axilla. Bowels regular; appetite in some measure impaired; looked pale and emaciated, and said he was generally much weaker.

On October 10th still confined to bed, laid on his back; countenance pale and sunken; general emaciation proceeded to a considerable degree; muscles loose, wasted, and flabby; slept but indifferently, and often suddenly awaked up, startled and intimidated; appetite much impaired. Tumour had become of an alarming size and appearance; integuments covering it much discoloured. In one place at the superior scapular region was a livid patch, of irregular rhomboid figure, from which there had recently been sero-purulent discharge, but this had now in a great measure ceased, and the place had become a dark brownish eschar-spot, slightly cracked, and imparted a roughness to the touch. Considerable anasarcal swelling extended over upper arm, axilla, and round to scapular region, the skin covering, which was bright and shining, and of a bright rose-purple blush; no pulsation at wrist; fingers and hand as before; lower arm much swollen; pulse in left arm weak and soft; tongue coated; bowels slow.

On the 25th of this month it was reported there had been much restlessness during the night, and the tumour was much the same. That afternoon, slight oozing of blood commenced, which continued to increase, flowing from an ulcerated orifice on the superior aspect, near the sterno-clavicular articulation. Vital powers on the decline.

The bleeding continued up to the time of his death, which was at four o'clock the following morning. The blood lost was of very

considerable quantity, and it continued to ooze away during fourteen hours.

Aneurismal tumours, both on the part of surgeons and physicians, have in later times received the special attention of accurate observers, so that now their pathology is well understood, and more correct notions entertained respecting their causes; nor is it surprising that so many inquirers have interested themselves in the subject, seeing that the affection is one of the gravest character, and when occurring in certain of the larger vessels, admits not of cure. Galen was the first who entertained any just notions of the disease; afterwards Vesalius and some others made attempts at giving a description of the lesion. In more recent times Lancisi, Guattani, Monro, Morgagni, Scarpa, Hunter, Hodgson, Breschet, and others have given elaborate accounts of every kind of aneurism. Various experiments have been tried upon animals, both in ascertaining their cause, and the best means of medical as well as operative cure. The former has manifestly little, if any, effect, notwithstanding the assertions of Valsalva and his followers; and where the surgeon's art is impracticable, we may deem the case as one of a hopeless nature. It is true that in certain rare instances a spontaneous cure has taken place, even in aneurismal enlargements of the great vessels; yet such are rare instances, and in our prognosis could form nothing more than a remote possibility.

Aneurisms may be divided into two great classes, *spontaneous* and *accidental*, the former resulting from a gradual and diseased change in the coats of the vessel, almost invariably the middle and internal tunics first becoming affected; the latter from sudden and positive laceration of the coats, as by powerful exercise, sudden tension, and external injuries.

Some authorities have affirmed, relative to spontaneous aneurism, that there is *invariably* a giving way of the middle coat; and such was the opinion of Scarpa, who said there is only one form of the disease, namely, that caused by a rupture of the proper coats of the artery, and an effusion of arterial blood into the cellular sheath which surrounds the ruptured artery, a doctrine which, although it is in the main correct, is not at all times true, because we know that dissection has in some instances proved the contrary. The whole of the coats may, by long-continued disease, become so softened and deprived of their natural elasticity as to simultaneously dilate, and this dilatation has been known to progress to a very considerable degree, all the tunics preserving their integrity. The fibrous or middle tunic is by far most apt to assume a morbid state; it loses its natural consistency, and becomes soft and flabby; in the interstices are often deposited calcareous matters, when the lining membrane changes to an indurated condition, and thus is rendered very liable to rupture. Sometimes dilatation will go on for a considerable period, and then the internal coats divide, as if from rupture, induced by over dilatation. The atheromatous condition

of the fibrous tunic is the morbid state most commonly observed, and to this opinion the majority of morbid anatomists have subscribed. In those vessels which are subject to much action, as the popliteal, disease is more prone to become manifest; hence the well-known fact of lamp-lighters and postilions being so liable to have bloody tumours in that part; and I well remember, when studying in Edinburgh, the observation was repeatedly made, that aneurism of the arch of the aorta was much more prevalent in the large towns of Scotland than England, dependent on the inhabitants living in flats, and thus the excitement given to the circulation, by ascending a considerable number of steps, by degrees induced dilatation of the arch. The long straight portions of an arterial trunk are never so liable to manifest morbid changes as the curvatures and the junctions of branches, the reason of which, on reflection, is obvious. When the blood, *in transitu*, impinges with more force against one part of the walls of the vessel, at such points will disease be liable to occur, because the vasa vasorum may thus be impaired in their functions or structure; hence the healthy vitality of the tissues which they nourish will be in some degree diminished, thus predisposing to morbid action, and because by long and continuous repetition, slight disorganization, by softening or rupturing the elementary fibres, might be caused. The great power with which the column of blood is sent from the left ventricle into the arch, no doubt contributes to the predisponent causes in the induction of frequent aneurismal enlargement, and especially where there is valvular or other obstruction, and an anormal divergence is given to the current. Morbidly increased impulse, especially if concentrated at certain points, cannot fail to endanger the healthy condition of the tissues at those points. Philosophical experiments made long ago by Lancisi and others, on leaden water-pipes, proved that partial obstructions made in the course of the pipe, and thus impelling the fluid with force towards a certain point, will burst the walls of the pipe; hence, deducing an analogy from such experiments, we may see the manner in which irregularities in the arterial trunks are calculated to operate, because the two fluids, in their transit, are subject to the same natural laws.

In spontaneous aneurism it does not always happen that there is entire dilatation, that is of the calibre of the vessel, and thus a nodus bulges from one side, the opposite lateral aspect of the arterial trunk preserving its natural evenness. When, however, the disease has for some time progressed, the entire walls of the vessel become diseased, that portion of the trunk dilating the most against which least resistance is offered by the juxtaposition of other organs; hence in aneurisms which have been called visible or external, as in this instance, we see the pointing was towards the surface. In spontaneous aneurism, the patient cannot with any preciseness mention the period of its commencement, whilst on the other hand those, for sake of contradistinction, termed *accidental*, can generally

be referred to a particular time, when of course the laceration of the fibrous coat would produce some degree of pain, or a sensation of giving way. This man, as mentioned in the report, could assign no cause for the tumour; hence it is fair to presume that it was rather referrible to gradual disease of the tunics than to their rupture.

I have above observed that Scarpa contended for rupture of the fibrous tunic; indeed he denied the existence of aneurism without the middle tunic giving way. Hodgson, and several other eminent inquirers, have expressed themselves differently, namely that aneurism may exist where there is integrity of the walls. Amongst those holding these views may be cited the names of Sabatier, Nägele, Ackermann, Breschet, Boyer, Dubois, Dupuytren, and Lisfranc, who arrived at their conclusions not from theory, but actual dissection. We can readily imagine that an artery may assume a disease by which it shall lose its natural elasticity, and become softened and expanded; if, however, this dilatation should progress to any considerable extent, the inner tunics will invariably give way. When these tumours are simple dilatations, they are then soft, and if externally situated, can upon pressure be emptied of their contents; but when the inner coats divide, fibrous lamellæ are deposited, at the first but to an inconsiderable extent at the inequalities formed by their corrugation, then increasing, and thus, by an accumulation of fibrous deposition, constantly becoming augmented, the tumour acquires a resistant consistency, which constitutes the second stage. It has been questioned by certain authors whether we can with strict propriety term that condition of the vessel, simple expansion of calibre, or even unequal distension of the walls, so long as their entirety continues, aneurism, because the lamellæ are not deposited. In this man, as reported, in the earlier stages of the swelling it was soft, and could on pressure be relieved, but when the layers of fibrin began to form, it acquired the resistant characteristics described. The deposition of fibrin, as remarked, never forms so long as the lining membrane is whole, for then none of the fluid passing along the canal can be carried out of the circulation, and it is in this stage of the tumour, when organizable matters are deposited in its cavity, that sometimes nature, by totally filling up the dilated sac, effects her own cure. When, however, an aneurism is in the large vessels, near the heart, the impulsion of blood is too great, and the current too much agitated, to allow the requisite quiescence for organization to proceed, and complete solidity result. The external coat, so called, is, on account of its cellular filamentous texture, far more distensible than the others, and thus it forms an expanding basement to the fibrinous lamellæ as the depositions increase, otherwise aneurismal tumours would attain but an inconsiderable size before their contents were freely poured out, and of course, if internally situated beyond the surgeon's reach, death would ensue.

On a review of this case, some facts worthy of notice present

themselves. In the first place a lesson is supplied that we can never be too precise and careful in our examinations of disease. Here was an affection of the gravest character, considered and treated as mere rheumatism; the man had been allowed to prosecute his work, which of course, by exciting the circulation, would tend to the aggravation of his affection; the blisters and plasters by which he was treated were manifestly mis-directed applications.

All writers agree that males are more subject to aneurisms than females; indeed in a table drawn up by Hodgson, out of a totality of sixty-three cases, fifty-six were males and but seven females. These were all examples of spontaneous aneurism. The experience of Sir Astley Cooper, Guthrie, Lisfranc, and others, bears testimony to the same. In accounting for this, it would be less correct to attribute it to congenital proclivity or natural tendency, than to the operation of causes, incident to the habits and kind of life in males. The greater exertions, more violent exercise, the many causes of excitement to which men are in various manners exposed, the very potent predisponent, intemperance, in which they so often indulge, all generally tend to render prevalent this disease, more in the one sex than in the other. Aneurisms, when they do appear, generally come on at an earlier period in life than in this man. Out of one hundred and twenty cases, given by Lisfranc, one hundred and eight were before the age of fifty-five, and that author has shown that from thirty to thirty-five is the period at which the greatest liability to their occurrence exists. When we reflect upon this fact, it seems a probable one, because at that age the vascular function is carried on with great power and force; in the meridian of life, great physical exertions are often and willingly performed, and because at that time there is often a plethoric condition, and then all those various causes of vascular excitement are in constant operation. The larger vessels are more prone to the affection than the smaller, because the impulsion of the column of blood is more forcible the nearer they are situated to the heart, just as a body is propelled with more force and celerity when it is first thrown into motion, than when it is becoming quiescent from the influence of resisting media, a law which similarly obtains relative to sound, because the walls of the larger vessels are not thick in proportion to their calibre, that is, when comparing them with the smaller vessels, and because in the larger vessels, especially the thoracic, there are more curvatures.

The stethoscopic indications were very distinct, and auscultation should never be omitted, because aneurisms have existed when not suspected; and conversely, tumours which have received impulsions from large adjacent vessels, have been sometimes wrongly considered aneurism. Each systolic action of the heart distends the tumour, synchronous with the arterial diastole, and there is then impulsion on the walls of the tumour, which impulsion gives rise to the percussion-sound. Immediately after the percussion sound follows a slight thrill, termed *fremissement*, the termination of which is

synchronous with the arterial systole, and at the commencement of the ventricular diastole. M. Gendrin says there are, in the aneurisms of large arteries, two impulsive shocks, the one by impulsion against the parietes, the other following the retraction of the tumour and corresponding to the arterial systole. In tumours, not aneurismal, there are not two impulsions because the impulsive percussion, caused by the termination of the retractive action of the sac, cannot exist except in true aneurisms; where the impulsion is but a transmission from the pulsation of a large adjacent vessel, there is only that isochronous with the diastolic arterial action. Premisement and the second impulsive percussion are always distinct in the earlier stage of the swelling, and when the tumour has for some time existed, they are in a great measure or wholly lost, this being dependent upon the increase of fibrous deposition and infiltration of serum into the subcutaneous cellular tissue, thus preventing the elastic contractions of the sac, and rendering the thrill less distinctly transmissible. The orifice forming the communication between the sac and the vessel is for the most part rough and irregular, and, at the arterial edges, are often found filamentous or pedunculated attachments; hence, from these bodies and the unevenness of the opening, the fluid in its ingress and egress produces vibratory sounds, exactly as we know this to be the case where there is morbid roughening or contraction at the auriculo-ventricular orifice, impairing the smooth transit of the column of fluid; hence, as noticed in the case, auscultation discovered a distinct bruit. If the opening between the arterial trunk and tumour is small, true synchronism between the aneurismal and arterial retractions cannot exist, owing to the tumour not momentarily becoming emptied of its contents. Attention to these physical signs, which are so pathognomonic of aneurism, will enable us to form a decisive diagnosis.

The increase of pulsation which there was in the right carotid might of course have been anticipated from the extension of the disease to the juncture at the arteria innominata, thus giving rise to obstructed circulation in that vessel, because in all cases where there is considerable disease in the subclavian, and as in this instance, in which the pulsations were felt in an increased degree close under the sterno-clavicular articulation, it is fair to infer that the inferior orifice of the carotid branch would in some degree be occluded.

An oedematous condition of the shoulder could not otherwise than succeed the great impediment given to the return of venous blood, by perversion and distortion of the subclavian vein; the numbness, declension of temperature, swelling and lividity of the hand, are most probable results. The complete cessation of the radial pulse is an indication of subclavian, as it is also of innominate aneurism; but in aneurism of the arch this is not the case. Barron, who gives a case of aneurism of the arteria innominata, mentions this fact. The pulse, says the relator of the case, cannot be felt at the right

wrist, nor can any pulsation be detected in the right brachial or subclavian arteries. It is often not very easy to decide, whether an aneurism be in the arch or in the innominate; when the radial artery ceases to beat we are led to conclude that it is the latter. In this man there were no bronchitic nor pneumonic attacks; hence, it is fair to presume the innominate was not enlarged, because when that vessel becomes tumid there is pressure upon the right bronchus, which gives rise to the diseases mentioned. I saw a case of aneurism of the arch of the aorta in the North London Hospital, which I auscultated and carefully examined, and subsequently I had an opportunity of inspecting the morbid parts. The man, during the latter part of his illness, had considerable dyspnoea, which morbid appearances fully accounted for. The lower part of the trachea was very obviously flattened, so much so, that the elastic fibrous membrane at the posterior or vertebral aspect of the rings, which joins their extremities, was obliterated by the continuous lateral pressure on the trachea; but the bronchi were natural, which would not have been the case on the right side if the innominate had been enlarged. Speaking of this man, the hospital case, it may be here mentioned, that during life, slight prominence was perceptible at the cartilages of the second and third ribs, and on inspection, the clavicle and first rib presented ulcerous erosions, of course consequent upon pressure exerted by the aneurism. Boyer and other authors allude to the destruction of bone by these tumours, and I have great reason to suspect that in the case I have given, very extensive decay of the clavicle and first rib had taken place, because several weeks previous to this death, manipulation gave the feeling as if a roughened end of this bone, the clavicle, were left by the process of ulcerative destruction, at the extremity of which it could be traced from the sternal end till lost in the tumour. It felt spiculated and abrupt.

A spontaneous aneurism, says Guthrie, is generally slow in its growth, not, perhaps, exceeding the size of an egg in a year, and rarely that of a flattened orange. In this example was a degree of enlargement far beyond that which Guthrie considers to be the maximum ratio of increase. In January the impulse could be felt but one-third of the extent which it could eight or nine months afterwards. In the first admeasurement from the superior pulsatory margin, passing over the tumour downwards, to the inferior pulsatory margin, four inches; horizontally, three inches; but in September the same admeasurements had increased to twelve inches and ten inches. The pulsatory thrill would be communicated much farther than the parietes of the aneurism extended, for it was not probable that the tumour itself would enlarge to such dimensions. The effusion and organized matter in the subcutaneous cellular tissues was the reason why the impulses could be distinctly felt so far as mentioned. The previously-named rules to be observed in diagnosis enable us to decide the question, because the impulsion against the

parietes, and the retracted impulsion, are only distinguishable when the aneurism itself is pressed upon. We know it to be a law in acoustics, that sound and the vibrations of tumours are more transmissible through the medium of a solid, than a liquid, body; and thus we judge of the nature of morbid collections in the thoracic and abdominal cavities. In chest affections it is often difficult to decide as to the cause of circumscribed dulness. In effusion the thrill of the heart's action may become very imperfectly recognised or even abolished. In instances of hypertrophy of the heart, with large liver, the pulsations will be distinctly felt in the hypochondrio-epigastric region, dependent upon powerful and anormally-increased action of the heart being communicated through the diaphragm to the engorged hepatic viscus, and so distinctly are the pulsations transmitted, that in one case which I now well remember, two practitioners maintained very diverse opinions relative to the true nature of the disease; one contended for cardiac hypertrophy, with enlarged liver, the other for aneurism of the descending aorta.

In external aneurisms, there are differences, not only in the progress of morbid conditions of the tumour, but also in the manner in which the mortal results supervene. In external aneurisms they die gradually, by the incessant oozing of blood; in internal aneurisms by laceration of the sac, when death momentarily ensues. The integumentary coverings of an external aneurism are too distensible to give way suddenly; as the tumour enlarges, greater pressure and distension are produced, and the cutaneous and sub-cutaneous tissues become engorged and swollen from obstruction in the circulation. Thus inflammatory action is instituted, and at that particular part on the external surface of the tumour where there is the greatest degree of pressure, an ill-defined pointing is observed, and at the apex of this a slough is formed, on the giving way of which the blood slowly discharges, until a mortal syncope supervenes. This man, it is seen, had this oozing for many hours before he sank. On reference to his case, it is stated that at one time the tumour was an irregular tri-nodulated swelling; before long one of the prominences became much larger than the others, and ultimately upon the point of it was found the fatal eschar. Internal aneurisms, not having the tegumentary coverings, and thus wanting that support to the distended parietes, burst by laceration, and not by the formation of an eschar. The external coat is so put upon the stretch, that at length it divides, and death instantly ensues. Hodgson, when speaking on this point, says, when the sac points externally, it rarely or never bursts by laceration, but by the extreme distension causes the integuments and investing parts to slough, and upon the separation of the eschar the blood issues from the tumour.

The treatment of this alarming affection very importantly depends upon the locality of the disease, and the more distant an aneurism is situated from the centre of the circulation, the greater

are our chances of effecting a cure. In cases where operative means can be had recourse to, there are great hopes of success, but where dependence is to be placed upon medicinal measures, such measures are almost invariably impotent—are a mere nullity. The means for adoption are a low non-stimulating diet, abstaining from fermented liquors, the avoidance of every cause of vascular excitement, whether of a mental or physical description, and such medicines as lower the action of the heart may always, with propriety, be recommended. The only hope is in the knife, and where such is impossible, vain, nearly invariably, are all essays at the cure. Pressure is only applicable in external aneurisms, and when so situated that there is a firm basis against which the pressure can be accurately applied, without injury to the subjacent parts, and where the collateral branches are sufficient to carry on the circulation requisite for nutrition. Popliteal aneurisms are, perhaps, most eligible for this method, because the pressure can be accurately adopted, the vessel is distant from the heart, and the collateral branches are sufficient to nourish the limb.

With respect to the application of a ligature, in all cases of spontaneous aneurism the vessel should be secured at some distance from the tumour, because, in such, the diseased condition of the arterial tunics extends generally both above and below the actual seat of enlargement; hence, if it is not taken up where the walls of the vessel are positively healthy, instead of the fibrinous plug being formed, and the canal being rendered impervious, ulceration takes place, and secondary hæmorrhage is the result. Some authorities have recommended the ligature to be applied on the distal instead of the cardiac side, but experience, and the opinion of more recent writers, have incontestably decided in favour of the latter. In a vessel of such large calibre, and so near the heart as this was, it would have been plausible to presume, had we not been supplied with proofs confirmative of the point, that the application of a ligature would not be attended with the same felicitous results, as in others of the arterial trunks, and the reasons for supposing so, are,—because the only place at which the ligature could have been applied, with any hopes of success, would have been at the innominate artery, which vessel it was highly probable was also diseased; and again, in four cases which I find where the innominate has been tied, all the patients died; because the innominate artery (supposing it to be in a state of positive health), by being so near the heart, might, by the inflammation which would necessarily be induced, extend that inflammation to the lining membrane of the heart, and thus institute a dangerous attack of endocarditis; and again, the powerful impetus with which a large column of blood would be propelled into the remaining portion of the innominate canal would be such as to prevent the deposition of fibrinous matter; and lastly, two such large canals as the carotid and subclavian being cut off, would the anastomosing branches be sufficient to maintain with due nourish-

ment, those parts which are, for a supply of blood, dependent upon those trunks?—and would not such an unequal stress being thrown upon the left side tend to engorgement in the left cerebral hemisphere? M. Rossi tried the distal method, by taking up the carotid and subclavian, for aneurism, of course, of the innominata, but without success, as the patient died after the lapse of six days.

XX.

ANEURISM OF THE LEFT VENTRICLE.

THIS term is now understood to imply a pouching, irregular bulging, or partial dilatation of the wall of a chamber of the heart, and communicating with the interior of the viscus. It may or may not protrude and alter the external configuration of the ventricle ; and it may be said, as the rule, to signify degeneration of the muscular structures. Pathologists now very nearly restrict the occurrence of this affection to the left side of the heart. It is true cardiac aneurism, and it does not mean that general eccentric dilatation to which this name was applied by the older authors. It is more common in men than in women. Of forty cases given by Thurnam, thirty were in males and only ten in females ; and it may supervene at any period of life.

Some time ago, an example of this affection came to my notice. A gentleman, of more than middle age, suddenly fell down in his drawing-room. He was, when first seen, lying partly on a sofa and two chairs, supported by his friends and servants. His face was livid, the eyelids were closed, nostrils dilated, mouth open, and the tongue was slightly protruding, which, with the under lip, was swollen, and of a darker hue than the face generally. The pupils were firmly contracted ; not the slightest pulsation could be detected in any of the larger arteries, nor could the hand or ear discover the feeblest action when placed over the præcordial region. There were two or three slight, apparently spasmodic, attempts at inspiration ; and, on his being moved higher up the sofa, the pressure on the chest and abdomen occasioned a noise in the throat familiar to those accustomed to *post mortem* examinations, but which was regarded by certain of his friends who stood by as groaning. Life was extinct.

On inspection, the body was that of a corpulent well-formed man. On dividing the integuments over the chest and down the abdomen, there was a subcutaneous stratum of fat, varying from an inch and a quarter to two inches in depth. On the removal of the sternum, the pericardium was seen considerably distended. On opening it, which was accidentally done, a considerable quantity of yellowish serum escaped, which, however, was not measured. On slitting up the pericardium to a greater extent, a loose dark clot of blood was discovered to completely encircle the heart, and, consequently, the

viscus was quite concealed. On carefully removing this mass of coagula, it weighed ten ounces. The heart was lying in its normal situation, and of its natural size. On being examined *in situ* to detect, if possible, the source of the hæmorrhage, a rent was discovered, about an inch and a half in length, with unequal edges. It was situated in the centre of the left side of the left ventricle. Around the heart, externally, the investing serous membrane was separated from the muscular substance to at least an inch and a half in diameter; and, on carrying the investigation deeper, the external rent was found to enter a cavity formed in the substance of the wall. It communicated with the interior of the left ventricle by a sinuous connection. The muscular tissue of the heart was considerably altered in colour and consistency, presenting the appearance of red softening; it was of a deep claret hue, and, under very moderate pressure of the fingers, the substance was readily torn. No appearance of pus was discovered. The walls were of normal thickness, and all the valves sound. No other morbid appearances were revealed in the thoracic organs. The abdominal viscera were healthy, with the exception of the kidneys, which were extensively diseased. They were embedded in an enormous quantity of fat, much enlarged, and of a claret colour or reddish-black; and both were lobulated, as in the fœtus. The capsules of each presented ulcerative patches, two of which in the left kidney were very deep, of conical shape, their bases being towards the surface, and they extended from half to three-quarters of an inch into the substance of the organ. The capsules were thickened, and readily torn off. On longitudinal section being made of these organs, there was considerable congestion; the tubular portions of both were completely obliterated, with the exception of a small part of the cones in the right kidney.

True aneurism of the heart is a disease of rare occurrence, and comparatively but few cases have been recorded. It is, however, a subject of great pathological interest, notwithstanding that we can know little or nothing of its presence during life; and it must be admitted, wherever it exists, it is a condition which must inevitably pass on to a fatal termination. Latham speaks with emphasis on this fact of the non-recognition of the disease. He says our clinical acquaintance with those diseases during life has not kept pace with our knowledge after death; that they have sometimes had their beginning and progress without there being suspicion of anything wrong with the heart. And again, he remarks that sometimes they have been attended with suffering enough to alarm the patient, and by symptoms enough to enable the physician to infer damage of the heart, and even to anticipate its fatal event, but not to be sure of its nature: such as faltering and failure of the circulation, and dyspnoea and anguish, either constant with occasional aggravations, or altogether occasional and in paroxysms; but whether constant or occasional, never attended with any previous auscultatory signs. The last named writer cites a case in which, from first to last, the

disease was undistinguished by any living phenomena. It has already been said that it is a pathologic change almost always observed on the left side of the heart. There have been some exceptional cases recorded in which the affection was located in the right ventricle. The immunity of the right side has been variously accounted for. Some have attributed its freedom to a want of power in these walls; others to the peculiarity of the valves at the right auriculo-ventricular orifice, which only incompletely close, and thus relieve the pressure by more or less of reflux within the right auricle; and it is clear there is generally far less tensory power in the right chambers. In looking to the etiological reasons why it is almost always in the left heart, it may be instanced that the arterial tissues are endowed with a higher degree of organisation and vitality than the venous; they are far more prone to acute inflammatory action; the arterial blood is more stimulating to the vascular coats, and the greater mechanical power of the left cavities is apt to lacerate the lining membrane and damage the muscular substance.

Corvisart was the first author of importance who described this lesion with accuracy, and, although Morand and Laennec speak of it, the former confines his observations to valvular aneurisms; and the latter, from his remarks, would lead us to infer that he had not met with true circumscribed ventricular aneurism. This author, in referring to Corvisart's case, terms it partial dilatation; and subsequently says he had never met with anything of the kind. Some sparsely scattered cases are to be found in medical literature long antecedent to the time of the last named authority. Brachet, Cruveilhier, Hope, Latham, Andral, Chassinat, Elliotson, Craigie, and Douglas have given accurate accounts of the disease; but the best and most comprehensive articles on this subject are by Thurnam, Quain, and Peacock. Of seventy-four cases collected by Thurnam, in fifty-eight it occurred in the left ventricle. Of this number, it was discovered in the apex of that chamber in twenty-seven of the inspections, at the base of the ventricle in twenty-one cases, and at an intermediate portion of the ventricle in fifteen examined. Of three hundred and three examples collected by Quain, it was at the apex in one hundred and thirty-eight, at the base in one hundred and one, and intermediately in only sixty-seven. Of more recent cases which have been given, in fourteen it was at the apex, in eleven at the base, in eight intermediate, and in six at the septum. The order of its occurrence, then, is the apex, base, external wall, and septum. In the instance above recorded, the aneurism was in the centre of the ventricle. It may occur in any part of the wall of the chamber.

These aneurisms greatly vary in size; they may be of all magnitudes, from that of a horse-bean to that of an orange, or even, in exceptional instances, to dimensions equal to that of the heart itself. Dr. Wales, of the United States Navy, some time ago published a case in which the aneurismal sac was so large that,

regarded *in situ*, the bystanders thought the man had two hearts. At the base and septum they are small. At the apex, they attain the largest extent. They may be circumscribed or diffused—that is, the lines of their boundary may be clearly defined, as when, by a narrow and cannulous passage, the enlargement communicates with the ventricular cavity; or there may be no line of demarcation, and the opening may be hemispherical—of the full diameter of the aneurismal pouch. The diffused variety is far more commonly met with at the apex. And it may here be remarked that the reason why the apex is more frequently the seat of cardiac aneurism is, doubtless, because there the wall of the chamber is thinner, and consequently the tissues are at that place more distensile. In thirty cases referred to by Peacock, in four they were named merely small; in five, they were compared to hazel-nuts or filberts; in one, to a pigeon's egg; and in six, to fowl's eggs. The margins are generally indurated by fibro-cartilaginous or osseous thickening. This line of boundary may assume the condition of a dense ring. In the case above described, the edges were merely irregular or ragged. The lining of the cavity presented a thin, easily lacerable membrane, which seemed a continuation of the endocardium. When an aneurism of this kind has originated from internal pressure, the endocardium may be so stretched as to cover in unbroken form the interior of the abnormal cavity. When the lining membrane has been inflamed, its corrugated and more opaque condition render its lines of demarcation more easily determinable. From the attenuated, or rather the abolition of, muscular structure at the point of rupture, it is to be inferred that, in this instance, life had, for some short time at least, been carried on; whilst the thickened visceral pericardium had alone maintained the integrity of the aneurism. The edges of laceration were precisely such as would result from a sudden tear. No organised lamellæ intervened like those which are found, and which for so long a period sometimes oppose the fatal catastrophe in aneurisms of the larger arteries. Sometimes, however, organised lamellæ, in greater or less amount, are formed in the pouch. In the more chronic cases, this kind of thickening is more common.

The etiology of these aneurisms can only be considered in conjunction with their pathology. Softening of the parietes has repeatedly been noticed. The wall may be of dark red, or reddish brown, or of the fatty shade of colour; and in certain examples the tissue has become easily broken down beneath the fingers. It has been thought that those primary lesions of the blood which occur in certain acute diseases, such as in continued, malignant, and the eruptive fevers, or in purpura and renal disease, and also in syphilis, may be regarded as the first causes of the pathologic change. It has been conjectured that coagula contained in the chamber might give rise to a localised expansion of the walls; but, unless in connection with some other circumstances, such could hardly be assigned as a reason. A prominent and ever accompanying state is a feebleness and a loss

of resistive power in the wall. A fibro-transformation is the very usual appearance revealed on inspection, and such can in most instances be referred to a chronic myocarditis. It is true, there may have been, for a starting-point, ulceration of the endocardium and some giving way of the lining under great muscular efforts, and the consequent ventricular tension. The membrane may have become thickened, with loss of elasticity, and slight solution of continuity ensue; the fissure would then become wider. Bloody detritus may be deposited, until such an amount becomes accumulated as to exert pressure on the subjacent muscular structure. The lining membrane sometimes exhibits villous vegetations. In chronic myocarditis, a gradual softening and degenerative change in the heart-fibre eventuates; and, as the inflammation of the pericardium and endocardium is nearly always the result of acute rheumatism, the last named affection is thus the more remote cause of ventricular degeneration; and, as a still more fundamental cause, blood-change is the primary morbid condition. Thickening and opacity of the endocardium are, however, generally the first cognisable alterations, and these are detected with more or less dilatation of the wall. With the progress of the affection, a dense yellowish or yellowish-white substance is discovered; and this may be mixed with more or less of muscular fibres, or the muscular substance may have been absolutely abolished. In certain cases, a large portion of the ventricular wall had been transmuted into such a pale dense product. This kind of new formation has by no means the resistive capabilities of the normal muscular tissue, and it would seem it is evidently liable to considerable distension. In certain instances, in which syphilis was regarded as the primary cause, gummata were discovered in the sac.

Under the microscope, after the disappearance of the transverse and longitudinal striæ, the fibrillæ become broken down and reduced into fine granular detritus intermixed with oil-globules. Afterwards, according to Niemeyer, the more advanced structural changes, irregular ramifying products, are noticed, of scar-like reddish-white substance, mixed with and substituting in greater or less degree the heart-wall. Some pathologists have named this degenerative condition as *steatomatous*. In some cases, the transformation is really cartilaginous, and in very exceptional examples the change passes on to be osseous. Dr. Wilks showed at the Pathological Society a very remarkable instance of this conversion. A man died of phthisis, and, on examination, the apex of the heart was adherent to the diaphragm. On the organ being removed, a hard bony tumour of the size of a pigeon's egg was projecting from the apex, which, on further inspection, proved to be a thin osseous case filled with fibrin, and connected with the left chamber by an oval opening. And this tumour was lined with a smooth dense membrane, which was continuous with the endocardium; and, what was still more singular, this bony transformation had resisted rupture, and the man died, as stated,

of another disease. It has been observed that embolism of some arterial branch may be succeeded by the molecular death of some particular part; and thus the sequel of a more extended inflammatory process becomes emphasised at some apparent spot and limited to a circumscribed area; and at such places there may not only be external pouching, but at such parts the rupture occurs. When the bulging is very large, the visceral pericardium may not cover it; the endocardium is often atheromatous; and the reflected pericardium also may assume a milky opacity. When these changes have taken place, the serous membrane, under its transmutation, cannot be freed from the muscular structure, or that product which has substituted true muscular tissue.

When the rupture takes place, it is generally at the apex of the aneurismal tumour and in the direction of the muscular fibres; and this catastrophe is not in the earlier stage of the sacculation, but it comes to pass in the more chronic condition, when the pouch-coverings have become thinned by absorption, until at length they are unequal to systolic pressure, or by some increased exertion of sudden straining, or by lifting some weight, or when at the stool. The body of a girl of fourteen was taken into University College Hospital, who had died very suddenly; and there was found, on examination, a thimble-like pouch at the base of the left ventricle, which was of cellulo-fibrous formation, covered by the peri- and lined with the endo-cardium. The sac gave way at the extreme point of projection, where the covering was the most thinned. Mr. Spencer Watson recorded an example of left ventricular aneurism which was of somewhat hemispherical configuration, and which gave way at the apex. In this last cited instance, the microscope showed pale yellowish fatty patches beneath the endocardium. In both of these cases, hypertrophy was the accompaniment. Of seventeen inspections of rupture given by Hayden, in fourteen the occurrence took place in the outer wall of the left ventricle; and of twenty-two cases of rupture adduced by Quain, it was seen in the external wall of this ventricle in no fewer than fourteen examples. It is a fact to be held in remembrance, that cardiac aneurism, unlike arterial aneurism, is quite as liable to occur from fourteen to thirty years of age as from sixty to seventy; and writers on this subject agree that this early tendency is mainly or almost always attributable to the precedence of acute rheumatism, which has already been instanced as the chief cause of the affection.

It has above been remarked, that ventricular aneurism cannot be indicated by any of the ordinary rules by which we are guided in diagnosis. In the example which I have now recorded, the gentleman had, prior to his death, a slight paralytic affection, as shown by numbness of the left arm. For several months before his decease, he had complained of pain and discomfort at the

posterior part of the thorax, immediately below the point of the scapula. But these symptoms are precisely such as occur in other forms of organic heart-disease, and they could throw no light on the exceptional nature of this affection. Peacock is inclined to believe that, if any specific symptoms can be relied upon, such are a sense of pain and weight at the region of the heart; but all who are conversant with cardiac pathology are aware that, in other organic forms of change in this viscus, the patient will thus complain of his ailment. Again, in some of the examples given by various authorities of the complaint, the patient was hardly inconvenienced; in others, the symptoms were characterised by no marked or peculiar indications; and in certain others there was hardly any evidence of a malady so grave and fatal. In the various forms of hypertrophy, and in valvular disorganisation, præcordial pains and heaviness are by the patient not unfrequently named. In right-side hypertrophy more especially, there is commonly a feeling of heavy dragging downwards; and not unfrequently uneasiness and a more or less pronounced degree of pain are the accompaniments. In those instances in which cardiac aneurism is small, and consequently where the action of the chamber is not mechanically much interfered with, the ordinary physical signs may give no information, nor may the patient be much discommoded. In such examples as have been narrated, and in which the tumour had attained large dimensions, there were recognised the more common states of cardiac enlargement. With scarcely an exception, when cardiac aneurism has been discovered on inspection, this pathologic change has been a surprise and in nowise expected. More than one aneurism may be present in this ventricle.

XXI.

DIFFUSE ANEURISM OF THE ABDOMINAL AORTA.

THE following case of aneurism is one of much interest, and which evidently was caused by an injury. A bricklayer thirty-eight years of age was admitted into the hospital. He was first attended by Dr. De Havilland Hall, the house-surgeon, as an out-patient. He then complained of lumbar pains extending down the left thigh and into the leg. He also complained of some aching pains in the thorax; but these were far less urgent than the pains in the back and left lower limb. Various remedies were tried, but they gave not more than temporary relief; and he continued to lose flesh and decline in strength. In the spring, his malady seemed to increase, and it became evident that he laboured under some grave disease.

On admission, he had an anæmic, cachectic appearance; and the facial aspect was suggestive of malignant disease. He had been a hard-working man, and on two or three occasions he had received injuries and been severely contused. Between two and three years before, he was partially buried by a quantity of earth which fell upon him when he was digging. About eighteen months prior to his coming into the hospital, he began to have grinding dull pains in the back, which were attributed to lumbago. On examination of the chest, no morbid conditions were detected by auscultation or percussion; the liver-dulness was normal; no tumour could be felt, nor did he at any part complain of pain on pressure; the tongue was moist and tolerably clean; the bowels were inclined to costiveness; the urine was passed in ordinary quantity, and the usual tests gave no evidence of morbid products; the pulse was 120, and somewhat sharp beneath the finger. He was treated with opiates, mild laxatives, cod-liver oil, and the iodide of potassium in a bitter infusion; and an external application, consisting of belladonna, opium, chloroform, and the linimentum camphoræ, was night and morning painted over the loins, which for a time gave relief. He had wine and a nourishing diet. He became worse, and the facial indications of suffering became more marked. After he had been about three weeks in the hospital, a swelling

began to appear in the left back. The tumour at length had so increased that it was six inches by five; and it projected about a couple of inches from the surface, its greatest depth being in the centre. Towards the circumference it became thinner, until its margins were lost in the subcutaneous tissues. There was no pointing, nor any discolouration, nor yet any throbbing; nor had there been rigors. It was elastic on manipulation. On placing the flat hand upon it, slight pulsation could be felt; and, on mediate auscultation, an ill-pronounced but distant bruit could be heard. It was bounded by the latero-posterior thoracic border, the quadratus lumborum, and the crest of the ilium. He complained of considerable pain in the left groin, which was continuous down the limb. Auscultation on admission discovered no cardiac disease; but now there was great dulness on percussion in the lower third of the left thorax; and at this part the breath-sound was weak and partly abolished. The pulse was 120, and intermitted. He became more and more exhausted; the features grew paler and more sunken, when he gradually expired, being conscious to the close.

The autopsy was made by Dr. Hall, eighteen hours after death. On opening the chest, a couple of pints of serum were taken out of the left side. On the removal of the left lung, four or five pounds of moulded bloody coagula were removed. On sponging out the cavity, and making a careful examination, a hole, which would admit the little finger, existed in the diaphragm, from which, on pressing the place of tumour externally, dark blood flowed. The finger readily passed into a large sacculated pouch. The right lung and heart were next removed, and no pulmonary or cardiac disease was discovered. The abdominal viscera were then taken out, none of which gave the least appearance of morbid change. In the left side, below the diaphragm, beneath the peritoneum, occupying the lumbar space, an irregularly defined enlargement was revealed. On making a free incision from the hole in the diaphragm, a diffuse aneurismal sac, which would hold a pint of fluid, was found; it was connected with the descending aorta. The laminae had formed walls at some points an inch in thickness. The inner surface of this sac was semi-organised, rugose, and with moderate pressure could be broken up by the fingers. It contained some coagula resembling those formed in the left chest. Blood had evidently become extravasated about the parts of lesion, and hence the appearance of the pulsating tumour in the back. The—and probably gradual—giving way of the diaphragm would account for the manner in which death occurred. The first, second, and third lumbar vertebrae were eroded with caries; the intercostal cartilages being little affected, as they seldom are in such cases.

It is possible, and even probable, that the accidents to which this man had been subject were the remote cause of the tumour. Most likely the coats of this great vessel had received some injury,

as there were no appearances of atheroma ; and, again, atheromatous deposits are rather the heterologous changes of more advanced life. The pressure which this mass would necessarily produce upon the lumbar and sacral nerves, and its absorptive effect upon the vertebræ, fully explained the persistent and almost irremediable pains under which he had so long suffered.

XXII.

OBESITY.

THIS is a disease, when going on to a fatal termination, that is only occasionally met with, even by those engaged in extensive practice. And as regards the medicinal treatment of such cases, most agents seem inoperative, beyond the mere exhibition of those remedies which increase the flow of the natural excretions, and thus keep up a constant drain upon the system. Those molecules are carried off which might, if retained, be converted into fat; but as we know that the deposition of fat, in these instances, is not in relative proportion to the consumed ingesta, and chiefly dependent upon perversion in the assimilative process, or, as pathologists have affirmed, that the disease originates first in the blood itself, the question rather merits an investigation into its fundamental causes, with a view, if possible, to successfully combat such causes. The rapid advances of chemical pathology which have of late thrown great light upon what were previously considered questions involved in impenetrable mystery, have developed facts so manifest, as to now lie beyond disputation; and whatever reflections the practical man may make on the investigated truths of those who would rear the superstructure of rational medicine upon the basis of philosophic deduction, it is too abundantly evident that the above-named, and other branches of professional knowledge, have supplied us, in the treatment of these kinds of affections, with principles without which the exercise of the art becomes mere empiricism, founded upon crude reasonings and vague speculations.

In many persons there is a considerable inclination to corpulence, which, when not excessive, is accounted as an indication of robust health, or as the result of an active vascular system, and a condition of the blood highly replete with those materials from which the various tissues are elaborated, than as evidence of morbid change; therefore, health and considerable increase of adipose matter may coexist, and are not incompatible with health. It is the excess of this substance which constitutes disease. The tendency runs in families, and it is seen as a national characteristic. The Dutch are naturally stout; the Chinese have the obese proclivity, and this is formed by hereditary transmission; and their segregation and never mixing with other races has continued to them this physical

inclination. In all history and in all ages mankind have become disproportionately fat in individual instances. The earliest of profane writers notice it as an occasional disease. The ancient Greek philosophers commented upon fatness, and had a right conception as to its purpose in the animal economy. They were in the right line of reasoning as to the mode of its morbid accumulation, but it was left to modern times, to experiment and induction, for more correct demonstration as to its physiology and pathology. The great leaders of human thought in *Academia Vetus*, and their followers, unfortunately for the progress of knowledge and the happiness of mankind, bestowed their powers on the vague speculations of metaphysical subtleties rather than on the demonstrative exposition of the laws of nature, and thus medicine, like other branches of natural philosophy, made comparatively little advance over the long lapse of many centuries.

All carneous, oleaginous, and farinaceous aliments favour corpulence, as from such the elements entering into the constitution of fat are plentifully elicited. In the normal state, when the body has acquired its proper standard of height, and has expanded to the adult dimensions, health is when there is a corresponding relation between the two great processes of decay and renovation, processes which, from the first embryotic commencement of the new being, to the latest moment of its existence, are continually going on, modified, however, by certain laws infallibly operating in the animal economy, as well as by numerous extrinsic influences that importantly bear upon these changes. When renovation becomes excessive, hypertrophy, partial or general, is the consequence; and late writers have maintained that even inflammation in a part is nothing more than an excess of nutrition of such part, and that the sequent train of phenomena are referrible to such cause. The common fatty tumour is but a partial obesity, and those cases in which the omentum in particular becomes so enlarged with fat as to give rise to what is vulgarly termed the pot belly, is another instance of partial and abnormal deposition of fat. Some of the encysted tumours, more particularly the atheromatous and the steatomatous, might probably with some show of reason be thus regarded. General hypertrophy always manifests itself by the deposition of fat, and if to a great degree, by the conversion of various tissues into that substance. The filamentous and muscular are, after the adipose, which is a tissue peculiar to fat, most liable to assume the diseased mutation. The localities where the chief depositions are found in the obese, are in the subcutaneous cellular tissue, the omentum, the filamentous structure around the kidneys, the mediastinum, mesentery, and the interstices of the muscles. The pericardium and appendices epiploicæ may also be instanced. When obesity is partial, the omentum, beneath the chin, the mammæ in women, and sometimes the nates, as in the *Bosjesmian Hottentots* which many travellers have not omitted to describe. There is a race of sheep at the Cape, in the bodies of

which partial obesity is so considerably developed in their hind quarters, as to quite destroy the animal's symmetry. Erasmus said there were four times as many fat people in England as there were on the Continent. There is no doubt the Teutonic race are more liable to it than the Celts.

Obesity is not confined to any particular period of life, as infants as well as adults labour under the affection; and illustrations are in medical literature supplied, where at birth the obese tendency was evident, and which gradually afterwards progressed to extraordinary magnitudes. Wadd, who is quoted by most writers on this subject, has given many instances corroborative of what is now asserted. This authority instances the daughter of an innkeeper, who at twelve years of age weighed thirteen stones. Don records the case of a Hindoo boy who became inordinately obese in his second year. At the age of twelve his whole body had become encased in an immense mass of adipose tissue, which hung in pendulous folds over his chest, hips, and flexures of his limbs. The genital organs were not larger than in infancy, and the testes were hardly developed. He was four feet high, and weighed fourteen stones. Mr. Parrot gave the example of a girl ten years old, who weighed twelve stones and a half, and who had a most voracious appetite. Down describes the affection in an idiot child, who was admitted into the Earlswood Asylum. At thirteen she weighed eight stones; and at twelve she weighed fifteen stones, though of very small stature. A girl five and a half years old was exhibited at the Physical Society of Vienna, who weighed the enormous weight of seventeen and three-quarter stones. There was no family tendency. She was just shedding her first teeth; she could walk with difficulty, and she could not stand without being supported. Her appetite and digestion were vigorous. She was of obtuse and sluggish disposition; the pulse was particularly slow; she never perspired; and there was subcutaneous extravasation of blood on the slightest injury. She was a veritable phenomenon caused by an enormous development of pure adipose tissue. Chambers gives the particulars of a woman who at forty-five years of age weighed twenty-eight stones eight pounds; of a publican at sixty, who weighed twenty-eight stones; and of a man, fifty-seven, who weighed not less than thirty-six stones! Some years ago, I attended a gentleman whom I had known in his earlier life. He was of peculiarly fine and fair complexion, with blue eyes and light hair. He attained to the height of six feet one inch. In early manhood he had great powers of endurance, and could walk to a greater distance and endure more fatigue than most men. At forty he was a large, handsome, and stout man, but still active. He then sprained his ankle, and this joint was left weak. He could no longer take his long walks. He then usually rode in his carriage. He rapidly became very fat, and this increase of size became a great discomfort. He had always been a large and hearty eater, and had taken his wine freely. He died at fifty-two, weighing between

twenty-six and twenty-seven stones. Towards the close of his life he had distressing attacks of dyspnœa, and œdema of the legs and thighs supervened. His great tendency to sleep became an overpowering symptom, and even at meals his hands fell by his side, and he slept. Both his parents were obese, and each descended from corpulent families. Isaac Butterfield, born near Leeds, when not two years old, weighed one hundredweight!

I may here give the particulars of an extraordinary case which I personally examined in a child, which was for some months publicly exhibited in various parts of London, and called the Infant Goliath. At birth he had three teeth, and when thirteen months old he had twenty-six teeth. He was of particularly mild and amiable disposition, scarcely ever being fretful and uneasy, as generally noticed in children of his time of life. Had light hair, blue eyes, and was of fair complexion. Around the shoulders he measured thirty-nine and a half inches; round the body, thirty-six and a half inches; round the knee, sixteen and a quarter inches; at calf of leg, fourteen and three-quarters; at ankles, seven and a half; at upper arm, fourteen and three-quarters; and below elbow, eleven and a half inches; weighed then, at three years and a month old, one hundred and twenty-four pounds! One of his relatives, his father informed me, weighed thirty-five stones twelve pounds. He was as tall as most boys at six years of age. The skin was soft and smooth to the touch, and, when pressed upon, imparted to the fingers that elastic, springy feel so characteristic of fatty formations. The subcutaneous accumulation hung in pendulous, annular folds on the limbs, and at the lateral aspects of the body bagged down in shapeless masses. The penis and scrotum I particularly examined, and found that the genital organs were not larger than in children. No testes could be felt, and the scrotum contained nothing but two thin cord-like substances, of not more than from one to two lines in thickness. His appetite was large, and he passed the major part of his time in eating and sleeping. After numerous questions were put, it was conclusive there was no precocity of intellect, and his deportment and answers were quite in accordance with such as might have been expected in children of his age. In eunuchs, and in the castration and spaying of animals, there is abundant proof how the absence of the testes and the removal of the ovaria favour corpulency, and that by their loss the body loses those fine lines of symmetry and proportion which belong to its perfection and beauty. A case may here be cited in which there was congenital deficiency of the testes, in an individual whom I had long known. From infancy he was fat in the extreme, and became most disproportionate and unslapely as he became older, and when at adult age he was a monster in appearance. He was below the middle stature; had no whiskers or beard; the eyes were sunken and small: the voice squeaking and effeminate; the hands were not relatively large in comparison with his bulk, and they looked like the hands of a woman; the scrotum and penis

were remarkably small; and there was no hair on the pubes. The inferior extremities were strangely unsymmetrical and loaded with overhanging folds of fat. The skin was soft and velvety, and the intermuscular lines natural to the male conformation were lost in smooth, even plumpness. There are cases on record, where the testes, from accident or operation, have been lost, when a change somewhat like the above described conditions has gradually supervened, proving how the genital organs influence the entire organism.

It appears to have been one of the many wise provisions of nature that all young animals should be endowed with a considerable amount of fat, thereby supplying an abundance of those materials so essentially necessary in the generation of animal heat; and, were it otherwise, young creatures would be liable to perish from a gradual declension of vital power consequent upon a deficient amount of animal heat, without which all tribes of warm-blooded animals could not exist. Chossat's experiments on this point have unequivocally attested the fact. It was found, when birds were deprived of food, that a diminution of temperature in their bodies resulted; and this fall of the thermometer was in a precise ratio with the increase of inanition. In some of these experiments, where the state of inanition was carried so far as to induce death, the thermometer fell on the last day to 25° Fah., whereas on the earlier days of the state the reduction of temperature was not more than three or four degrees. On examining the various organs after death, more than 90 per cent. of fat had been absorbed; and those animals which at the commencement of the experiments had the greatest amount of fat, lived the longest. When artificial heat was applied before death, the animal was for a time somewhat revived, and the torpor immediately returned as soon as the artificial heat was withdrawn. From these investigations into the laws of animal heat, Chossat had incontrovertibly shown that fat is really the fuel from which the calorific agent is obtained; that any continuous existence is incompatible with the entire loss of it; and that, of all the solids of the body, it is by far the most quickly consumed; that, where the protein compound is not supplied for nutrition, life can for a time be sustained by the absorption of this material existing in the body itself.

Food consists of azotised or nitrogenous and non-nitrogenous principles. The first includes all fibrous and albuminous matters, which only go to blood and muscle. The second, the calorificient or respiratory class, consists of oily or fatty materials, with sugar, gum, starch, and vegetable acids, the elements of fat. The last named go to the generation or evolution of heat. It might have been mentioned that this experimenter found the nervous tissue scarcely in any degree below its normal weight, whilst every other tissue had undergone considerable diminution; from which it might appear that the nervous tissue and the healthy maintenance of the nervous centres were intimately dependent upon the fat of the body,

and not, as other organs, upon the protein-compound; hence we have a theoretical explanation why individuals of active brains and great nervous irritability are seldom fat, because the increased exercise of any organ evolves an increased quantity of effete molecular particles, and increase of waste demands a commensurate augmentation of renovating materials; therefore, if the materials which go to nourish the great nervous centres are mainly educted from the fat, leanness and an active nervous system stand in intimate relation to each other. Animals inhabiting the arctic regions have a far greater adipose development than those which are natives of the tropics; because in those cold regions it is required that more carbon and hydrogen should be *burnt* for the keeping-up of the respiratory function. An Esquimaux or a Greenlander could not bear the rigorous cold of his northern climate if he did not feed largely on oleaginous articles of food; hence, what may, by those living in a temperate zone, be considered a vitiated taste, is precisely in accordance with the real wants of their bodies, and without such kind of nourishment an existence in those latitudes would be insupportable: therefore, all those animals upon which they live afford an abundant supply of the fuel upon which the flame of life is kept alive. This law in the animal creation, and the need of stored-up materials to be burnt off in the system, has long excited the cupidity of arctic voyagers, to supply fat and oil for the necessities and conveniences of life. The peaceful Hindoo can live in positive health on a far less heat-giving aliment, because the climate supplies the body with much of that warmth which in arctic regions it is obliged to generate within itself from a continuous chemical combustion. There is a caste of Brahmins who have not eaten flesh or drunk wine from the beginning of the world, which would have rendered extinct a northern tribe; yet they live in health, and are a fine people.

In infants there is a considerable supply of fat, exactly in accordance with those laws which have been described above, relative to the inhabitants of cold regions. The respiratory and circulatory functions in the young are carried on with far more frequency than at an adult age; hence the processes of decay and renovation will be relatively greater, and especially the latter, which by exceeding the former gives rise to *growth* or increase of volume. It compensates for tissue waste as well as supplies fuel for respiration. The particles given off by a quick circulation are carried in abundance to the site of assimilation of the tissues, and, as they are not proportional to their generation, drawn off as waste by the effete emunctories, and transformed into various tissues. This supply of fat to the young is in a great measure deposited in the subcutaneous cellular tissue, where it cannot possibly interfere with the natural performance of the vital organs, nor encumber the visceral cavities; and as the internal parts of the young, during that state of inaction incident to their inability for exertion, might have been deleteriously affected by a low external temperature, the subcutaneous interposition of adipose matter is highly calculated

to avert the evil consequences which might otherwise have followed. When infants are morbidly fat, the depositions formed in a normal quantity in various parts are of course succeeded by similar phenomena to those witnessed in adults; there may be mechanical obstruction given to the respiratory and circulating apparatus, and it has been said that there is torpidity of the bowels. The child to whom I have referred could not undergo even moderate exercise without accelerating the breathing; and the somnolent tendency was so constant, that whenever left in a state of quietude he fell over into a slumber.

Females are decidedly more predisposed to the obese condition than males. It has been computed that fat should form one-twentieth of the entire weight of a man, and one-sixteenth in the weight of a woman. By this provision less muscular activity is needed for heat, and it contributes to the finely rounded lines, the smooth symmetry, and the beauty of her frame. It rounds irregularities, and lessens attrition by the lubrication of opposing surfaces. The eye and the heart by it glide freely in their movements, and the purpose of the omentum and mesentery become obvious. When, either from the time of life or other cause, the irritation of the genital organs is not present, the liability to fatness is much more favoured; and most of the cases of obesity which we find recorded, have been in early life, or at that age when the desire for their exercise has considerably abated. Mental quietude and freedom from care induce it. Coachmen who are well fed, easily worked, and who are in the open air, so as to maintain health, become fat. M. Parent Duchatelet has stated that prostitutes in Paris, who had no venereal disease, are inclined to fatness. It sometimes comes on after childbirth, syphilis, surgical injuries, and in chronic insanity. On referring to the autopsy of the female hereafter to be given, it will be seen that the uterus and ovaries were, even in so large a person, smaller than natural. After the meridian of life, the impulses of the passions operate with less power, and there is then an increasing partiality for less corporeal exertion, whilst, perhaps, there is a stronger relish for the indulgences of the table. On examination of the histories of these cases, it will generally be found that other branches of the family have been more or less inclined to polysarcia; or, in other words, that they are predisposed to it by an hereditary tendency, which, as it has been seen, was the fact in the instance of the child to which allusion has been made. Dr. C. J. B. Williams, in his article on this disease in the "*Cyclopædia of Practical Medicine*," speaks of sthenic and asthenic obesity; the former of which that writer asserts is characterised in persons who have unimpaired constitutions, live on a full and highly nutritious diet, with whom the secretions are normally eliminated, the circulating function carried on with energy, and the blood-vessels well filled with a healthy fluid, and where the corpulence first becomes developed rather as an excess of health than as the primary condition of disease. The latter, says that writer, is commonly allied with a leuco-

phlegmatic temperament, a soft languid pulse, defective excretions, and a low irritability of body.

There is in such individuals a sufficient activity of the first part of the digestive process; but a somnolent disposition, often present for some hours after meals, indicates the admixture of chyle in the circulation, and a tardiness in its assimilation. The chyle thus supplied probably abounds more in fatty particles than in albuminous globules; until, therefore, the former are deposited from the circulating mass in the adipose membrane, the blood does not recover its natural and most healthy constitution. It has already been mentioned, when citing the experimental investigations of Chossat, how the fat of the body is more liable to absorption than any other tissue, and that, indeed, the blood can, during inanition, for some time be so renovated by its absorption from this substance, as to be supplied with a certain degree of stimulus necessary for the carrying on of the vital functions. It is, too, in this manner explicable why great bodily exertion is inimical to corpulence; the waste exceeds the amount of renovating materials supplied by the ingesta; hence, increased activity of absorptional function, and the further demand which there is upon the nutrifying properties of the blood, is made up by the absorbents falling back upon the fatty tissue. Now, if in the leuco-phlegmatic temperament there should, from some cause, be a diminished degree of absorptional power, together with the co-existence of other and acknowledged conditions that favour the above deposition, as corporeal inactivity, a sluggish nervous system, defective action of the sudoriparous and renal organs, and a diet possessing a considerable amount of carbonaceous and hydrogenous principles, it may be readily supposed that the blood would then eliminate a less quantity of fat vesicles from the circulation than ought to have been given off, and that these vesicles would, in the assimilation of the tissues, be of course deposited by the adipose tissue.

In some individuals in whom the circulatory function is carried on with great activity; where the vessels are large, filled, as it were, to plenitude; and when the blood is drawn presents all those conditions commonly known as characterising *rich* blood, as in a person of bilious temperament; yet such individual, with these peculiarities, with a blood abounding preternaturally with fat vesicles, may have at the same time rather an inclination to leanness than corpulency. In an instance of this kind there would be an increase instead of a diminution of absorptional power, whereby the fatty particles and other nutritious materials of the blood would in too great a degree be taken up into the circulation, and in abnormal amount carried away from the seat of the assimilative process, to the various excrement organs of the body, especially to the liver, which viscus, from this excess of action imposed upon it, is prone to become ultimately obstructed and permanently torpid. In the sthenic form of obesity, which has been termed an overflowing of health, of course the hepatic viscus, like all other organs, partakes of that hypertrophic proclivity which the

system has generally acquired. Whatever may be the rationale as explicable of enlargement of the liver in polysarcous subjects, it is undeniable that it is generally found in the autopsies of such, of preternatural volume. It is true that as the disease advances there are conditions highly favouring its congestion, such as mechanical obstruction, torpidity of the bowels, considerable appetite, a sedentary mode of life, sluggishness of the mental faculties, and perhaps, very generally more or less of renal disorder. All authorities agree that the liver is much concerned in the fatty transformation. From some inexplicable abnormality in the system there is a proneness to the transmutation of glycogen into this substance, and from certain hepatic derangements a large amount of glucose may go to this change. And there may be deficient oxidation of the oily materials. The pancreas digests fat, but the bile does not. In the examinations after death of the obese, the liver, as the rule, is found diseased, and the pancreas in a healthy state.

There has been amongst pathologists considerable diversity of opinion relative to the real manner in which fat is formed; some contending for its being deposited in the filamentous texture; others that there is a tissue proper for its formation; and one writer imagined fat to be a solid, constituted by the juxtaposition of granular particles, without any investing or interposed membrane—an opinion which microscopical observers have decided as erroneous. Fat vesicles are spherical or spheroidal, or sometimes, when dependent upon pressure, assume polyhedral figures. William Hunter gave it as his belief that there was a distinct adipose tissue, to which way of thinking Bichat, Beclard, and others subscribed; whilst Majendie, Haller, and certain other authorities considered fat merely as deposition in the cellular structure. Williams considers the Hunterian doctrine on this point most tenable, and, indeed, such seems now to be most generally admitted. Wherever there is the greatest abundance of cellular tissue, there we find the largest quantities of fat, and by far the most in the subcutaneous cellular tissue, in the interstices of the muscles, and those other localities favourable to its formation, which have been mentioned above. It has been satisfactorily shown that fat vesicles *do* exist in the blood immediately before it passes from the thoracic duct into the general circulation; and as it is so generally and easily discovered in the blood, it is probably partly received with the food, says a writer on this subject, and partly formed by the process of secretion. In the normal condition of the body, fat rapidly passes out of the blood, and its insolubility constitutes one of those beautifully perfected laws in the organism, without which health and life could not exist. It conveys out of the circulation the elementary constituents of hydrogen and carbon, and which are demanded for combustion. Its less tendency to oxidizing than starch and sugar, points out demonstrably its peculiar and proper adaptation. If it be true, then, that fat-cells are transferred into the circulation from the ingesta, and that such cells are physically

adapted to the process of assimilation, we can at once easily perceive why it is that fatty aliments so abundantly produce fat, as remarked of the Greenlander and the Esquimaux. It appears on certain accounts probable that such is more dependent upon the requisite elementary principles being supplied, from which the adipose secretions could with more facility be carried on, than when the elaboration is from matters less assimilated in their constituents than in oleaginous compounds. The substance contained in fat vesicles consists of stearine, margarine, and oleine, the two first of which, when separated from the latter, maintain a formative shape of solid character, the latter remaining even at low temperature in fluidity. Each of these substances forms considerable proportions of carbon and hydrogen; therefore such food having an abundance of these elements will of course predispose to the generation of fat, such as various non-azotised compounds; that used as diet, the saccharine, amylaceous, oleaginous substances.

Experiments made in the feeding of the lower animals have proved how the addition of sugar to their food favours the feeding process. For cane sugar, the following is the formula:— $C^{12}H^{10}O^9$; starch, $C^{12}H^{10}O^9$; here are then those indispensable elements in the formation of fat. Starch and sugar are the great sources from which fat is produced. Now if we have to abstract from starch $C^{12}H^{10}O^{10}$, nine atoms of oxygen fat would be the result, as the latter is a formula for the substance. From this and other facts of a like nature, which might be given, it is incontrovertible that fat is produced by a deoxidating process on non-azotised materials. Liebig has pointed out, that when there is a deficient supply of oxygen, the production of fat, which is the consequence of this deficiency, yields a supply of that element, and thus seems to keep up the animal heat and the vital functions. A goose tied up, and fed with farinaceous food altogether destitute of fat, acquires in a short time an increase of weight, the whole of which is fat. Again, the bee produces wax, a species of fat, from pure sugar. The negroes of the West Indies, and the Chinese slaves, sometimes acquire an enormous size, during the sugar season, by drinking the cane juice; and it was remarked by Galen, that the keepers of vineyards, who live on nothing but figs and grapes, become fat. The ladies of Tunis and Tripoli are fattened, to please their lords, with farinaceous food, and a seed called *drough*. Among the Asiatics there is a sect who pride themselves on their extreme corpulency; their diet consists of farinaceous vegetables, milk, sugar, sweatmeats, and ghee. They look upon corpulency as a proof of opulence; and many arrive at a great degree of obesity without tasting anything that has ever lived. Numerous instances might here be supplied where great drinkers of malt liquors have attained to extreme degrees of corpulency. It is the opinion of some that a century ago fat people were far more common than in these days, when the yeomanry and middle classes drank deep potations of malt liquors,

instead of ardent spirits. The elementary constituents of ardent spirits being alcohol, and an abundance of carbon entering into the formation of that compound, there is thus supplied an important material for the generation of fat; and were it not for the stimulation which alcoholic liquors gives to the circulating function, and the increased action of the kidneys, which thus oppose the obese tendency, all descriptions of spirituous compounds would render dram drinkers more liable to corpulency. Those persons who are great gin drinkers are, from the diuretic properties of that spirit, less prone to become fat than those who are great rum drinkers; a fact which the vulgar have long ago observed, and which has amongst the lower orders passed into a truism.

From what has been said above, it must be regarded that fat is secreted by a peculiar tissue, the adipose; and to this view most modern physiologists subscribe. Hassell, in speaking of the formation of fat, says it will be observed by the use of a lens only, that these masses, the fatty, are each composed of a number of distinct and opaque bodies of various sizes, presenting a smooth outline, having a more or less rounded or oval form, and held loosely together by fibro-cellular tissue, the extension of which forms the envelope that invests each of these bodies; it will also be further noticed that each mass of fat is supplied with one or more bloodvessels, and that these break up into numerous lesser branches, one of which goes to each of the previously described bodies, being conveyed to it by the connecting fibrous tissue, and having reached the body it undergoes a further subdivision, the branches extending over its entire surface. The writer then proceeds to say that the vesicles are filled with cells, and these cells again with globules; that these globules go on becoming larger in size until they assume the normal characteristics of the matured fat vesicles. From these observations it is obvious there is a greater secerning process; that there is a filamentous investment covering each vesicle; and that the fat particles are not merely placed in juxtaposition, as contended for by Meckel; and it may be inferred that the granules are produced from the blood by an exosmosial process at the capillary extremities, like unto what we know of similar functions in the formation of other tissues in animals as well as in the vegetable kingdom.

It may be said, then, that the majority of modern pathologists are in accord, that fatty tissue is modified connective tissue. Flemming asserts that it is developed in the tunica adventitia of the blood vessels, and around those which are completely formed, and which are thickly set. He says there is no special or preliminary tissue, and that the term adipose tissue is superfluous. This authority goes on to say, its production occurs only in isolated form, and around certain vessels of the fatty lobule; that some is accumulated in the walls of the large fat cells, but the most is in the fixed connective tissue cells; and migratory cells are seen in great abundance. The young fat cells have no membrane, are angular,

spindle-shaped, or polygonal; they are like fatty molecules, and the smallest hardly exceed connective tissue corpuscles. In the distinction which has been observed between the degenerative fatty change which Rokitansky long ago designated as false hypertrophy, and the obese condition, the former has been named molecular, and the latter vesicular fat. Each vesicle is a separate entity, a perfect development. Paget says their contents do not transude by exosmosis. They are developed in foetal life so early as the third month, and are much smaller than in the adult. Chambers says it is clear then, that the substance cannot be formed by mere exudation from the bloodvessels, and that it must originate in a vital process of secretion which acts in spite of the physical principle opposing the transudation of oil. There is a change in the state of the blood in the obese, whereby fibrin is not normally produced, and there is a tendency to an interstitial decomposition of oil. And the lacteals absorb more fat from the bowels than is needed for the supply of carbon for the respiration.

I shall now proceed to detail the particulars of a case of obesity, which I saw with my friend, the late Dr. Browning Smith of Kensington, and which, from the enormous size that the patient acquired, the history of the disease, the persisting progress of the complaint despite of all remedial measures, together with other points of interest, must needs be considered as a remarkable example of the polysarcal affection. It was in a married woman, forty-one years of age, of light complexion. She had not borne any children, but had a miscarriage soon after she was married. Twenty-three years prior to her death, at the age of eighteen, she was very thin and delicate. In the course of a few years subsequent to that time she became considerably stouter, had more colour, and was of better health. Eight years before her decease, this corpulency more rapidly increased, and continued to increase. For several years she had eat and drunk to a considerable extent, and on inquiries being instituted, it was ascertained that throughout the day she, at short intervals, took some description of food or malt liquor. Though she never drank spirits to intoxication, she indulged in regular and frequent potations of gin. She took but little exercise, and seldom felt inclined for any active exertion; was of placid and kind disposition, and rarely allowed any circumstance to ruffle her mind; slept soundly, and often during the day would fall over into a transient slumber. Attacks of difficulty of breathing at times confined her to her room. She then would complain of pain over the right hypochondriac region; great tendency to somnolency also existed, and there was a positive aversion to any active exercise. Catamenia were then abundant. Continued doses of saline aperients, a low diet, with the interdiction of fermented liquors, were in the course of a few weeks succeeded by manifest relief. When I first saw her she was raised in the semi-erect position, and on entering the room I was forcibly struck with the patient's enormous size; indeed, to such a magnitude had she attained, that it was no extravagant

assertion to say, that she almost occupied three-fourths of a moderately sized bed. The mammæ had become so exceedingly large, as in a pendulous manner to hang down the thorax, whilst the cheeks, the throat, and about the submaxillary region, was so grown up and distorted with fat, as to have obliterated the natural configuration. The abdomen was of immense size, and hung over the anterior part of the thigh to a very considerable extent; the inferior extremities were shapeless masses, resembling in magnitude that œdematous condition met with in anasarcal dropsy.

The tegumentary covering on inferior part of abdomen felt rough and indurated, imparting to the fingers a horny or scaly sensation. On inspection, an erythematic blush co-existed, which in some parts had gone on to the vesicular eruption; and in the sulci formed by the flexures a serous exudation was manifest. This erythematic affection was very persistent, and although it was at various times considerably diminished under the different local applications employed, yet no means, topical or general, entirely dispersed it. The breathing was difficult and laborious, and she had a wheezing cough; her voice was unnatural, and when she spoke it reminded the hearer of any one speaking who had tonsillitis, or as if by a ligature being placed round the throat the patient's larynx were compressed. There was a peculiar, sleepy, listless expression about the eyes, and the nurse reported that when left alone she invariably passed into slumber. The pulse was full and strong, but from the interposed subcutaneous deposition of fat, unless the wrist were pressed rather strongly by the index finger, the pulse felt less forcible than it really was. The catamenia had some time ago ceased; the excretory evacuations were carried on almost normally; the tongue indicated no fever, nor gave evidence of any gastric irritation. A constant employment of salines and diuretics was continued, and the requisite injunctions respecting a low and moderately nutritious diet. She continued much the same, progressively becoming larger, the breathing being more difficult, and the somnolency being more irresistible; indeed, it was evident the case was verging into one of hopeless character. Salines, nitrate of potash, elaterium, alterative doses of mercury, had been of no avail. Dr. Bright was called in, and he recommended the iodide of potassium; but this nor any other remedy was of avail. She gradually became worse, increased in size, the somnolency became more persistent; at length the breathing was alarmingly difficult; the countenance looked livid and congested; and, lapsing into a lethargic condition, she died, with the symptoms of coma.

An inspection was made twelve hours after death. The cutaneous surface at some parts was livid, especially at flexures of inferior extremities. On raising up the pendant abdomen much lividity was apparent, particularly at mons veneris and about the labia; it also extended to the abdominal parietes. On those parts there was a sero-purulent secretion. Face congested, and from nares freely distilled

a frothy, brownish fluid. The following are accurate admeasurements of various parts:—

	Inches.
From nipple to nipple	14
Girth of chest to immediately below axillæ	56
„ abdomen, passing over umbilicus	77
„ upper arm	17
„ ankle	15
„ calf of leg	21
„ middle portion of thigh	28
„ round upper portion of thigh	43
Depth of body as laid on back	23

Carrying down an incision in the ordinary manner at the mesial line, from the upper third of sternum to pubis, the subcutaneous stratum of fat over the sternum was four inches deep, and midway between umbilicus and pubis it was no less than eight inches thick! The section presented a surface of coarse fat, and on minute examination small ramified vascular branches accompanied the filamentous tissue, which had assumed a thick and resistive texture. Removing the sternum, the lungs were somewhat mottled of the light grey colour which characterises emphysema. Both were throughout agglutinated to the pleura costalis, which soft, easily-lacerable bonds of union readily gave way, as the hand, edgewise, was slid up between these organs and the thoracic walls; and the resistance was scarcely so much as that which attains where deposition of lymph is recent. On examining portions of this interposed matter we were at once satisfied of it consisting of scarcely anything but fat. The pulmonary organs were larger than natural, but with such increase of volume, and the previously mentioned emphysematous appearance anteriorly, no other pathological conditions were apparent. As the rule, in these cases there is lessened vital capacity of the lungs, because they do not contain so much air as they ought to do normally; this vital diminution is also caused by more or less of congestion of the pulmonary tissue; and from impeded movement of the upper ribs. This impediment to movement of the thoracic walls seems, however, on inspection more proclaimed than is the fact by the masking of their motion by the super-imposition of fat. On opening the pericardium, three or four drachms of straw-coloured serum escaped. The heart was considerably larger than normal, weighing, as it was removed, one pound twelve ounces. The right ventricle was well-nigh covered with a coat of fat varying from one to three lines in thickness, and which, on being torn off, indefinitely blended with the muscular tissue, by the transition of the muscular fibres, first into a pale opaque substance, then insensibly passing on to veritable fat. The walls of all the cavities were hypertrophied, those of the right ventricle being four lines in thickness, and in the left measured nine lines. The edges of the valves felt soft and fatty, and the corpora arantii, both at semilunar and pulmonary, were more tuber-

culated than normal; and on the point of a scalpel being applied, the increase of these bodies was caused by the deposition of fatty matter, and it easily broke down between the fingers, being of far softer consistence than the vegetations sometimes met with at the apices of these organs.

Exposing the abdominal viscera, which, however, could only be imperfectly done, notwithstanding the mesial incision having been carried down quite to the pubis, from the enormous thickness of the parietes, the organs were completely agglutinated by, lost in, huge masses of fat. The omentum was of enormous size, and from it proceeded prolongations of pure fat, thick as a moderately sized candle, from one to four inches in length; the appendices epiploicæ had become so morbidly large and expanded as to almost cover the large intestine. The liver was by the same substance adherent to concave surface of diaphragm, weighed seven pounds six ounces, was of a pale yellow brown, and sections showed its parenchymatous structure to have degenerated into that pathological condition known as the nutmeg character. The spleen was greatly enlarged, weighing one pound seven ounces, and on being cut the surfaces showed its colour to be preternaturally dark; it was assuming the jammy consistence, and a semifluid matter followed the knife, a good deal resembling what is observed in autopsies when the patient has died from fever distinguished by intermittent symptoms. The right kidney was encased in a nidus of bright yellow fat, which covering alone weighed thirteen ounces, and the kidney itself twelve ounces. On longitudinally dividing the organ, disease of the cortical substance was abundantly manifested, the granular degeneration being most complete, and descending deepest into the medullary structure in its central portion. The same description applies to the left, only the change attained to a greater extent. The uterus and ovaries were exceedingly small; the former felt hard and cartilaginous, and its cavity was contracted.

The details of the previous case are quite in accordance with what we know of the general characteristics of the disease. The gradual and uncontrollable mode of its supervention; the utter uselessness of remedies; the symptoms of somnolency, and embarrassment of the respiratory organs; the tranquil, inert disposition; the manner in which the fatal termination ensued, with other states, are similar to two other instances of obesity that went on to the destruction of life. In a majority of not less than three-fourths of those who die of this affection, the patients are of sanguino-phlegmatic temperament; and if any one will refer to the various evidences given corroborative of this assertion, it will be found as the case; and in those who have not an extreme tendency to the corpulent condition, the same holds good. What has already been advanced respecting the nervous system and the secretion of bile in those of the bilious temperament, with reference to the fatty tissue and its formation in the system, is explicable of this proneness of sanguino-phlegmatic to assume the

obese condition. It has been stated that this woman took considerable quantities of food, but yet, when placed upon an unnutritious diet, the polysarca went on. A like circumstance, with regard to this point, I well remember occurring during the time I was house-physician in the Edinburgh Royal Infirmary. The patient was a female, about forty years of age, of short stature, and so obese as from the first to make her case considered one of alarming character. The features were grown up with fat; and the eyes looked small and sunken, from the cellular deposition of this substance around the foramina. Even walking up and down the ward was attended with difficulty, and the exertion gave rise to further embarrassment of breathing, which was even in a quiescent state hurried, short, and laborious. When she spoke, there was the same thick, quinsy-like enunciation as observed in the example described. The appetite was preternaturally large; somnolency so persistent, that whenever left but a few minutes to herself, she dozed over into slumber. There was a torpor of mind, an aversion from all exercise, a listless apathetic state, which so characterise this curious disease. She was ordered a diet not more nourishing than allowed to the fever patients, consisting chiefly of panada and slops, yet the polysarca progressed, and after being some time an inmate in the hospital she died, with comatose symptoms. In these cases the system no doubt absorbs, in a morbid manner, hydrogen from the atmosphere. The autopsy much resembled that above given, but in considerably less degree. As I did not, however, preserve any notes of the post-mortem appearances, I cannot particularise the morbid conditions.

Another instance I may here mention of a lady who arrived at adult age and then became remarkably stout. She was of fair complexion, and had borne no family. Exercise, partial starving, and every probable expedient, were had recourse to, yet without any amelioration. The malady was not to be arrested, and she, too, died in a lethargic condition. The breathing was laborious; somnolency during the close of her life so urgent that, unless constantly conversed with, or by some such means kept awake, she would drop over into sleep. This invariable symptom of somnolency, of course, results from mechanical vascular obstruction, which the depositions of fat along the course of the vessels, especially in the neck, produce. The venous blood flows tardily through the sinuses, which, becoming distended, create more extensive encephalic congestion; hence that inanimate expression of the eyes, the clouded intellect, the irresistible drowsiness. Although the head was not opened in the section recorded, from the manner in which death took place, the comatose symptoms terminating the illness, it is highly probable the cerebral cavities were distended with serous fluid. The erythematic redness on inferior surface of abdominal parietes was the result of capillary congestion produced by gravity, and the sero-purulent condition of the skin at the flexures could not otherwise than ensue from the friction and constant pressure to which it was subjected; hence the

failure of all applications where a cause so excitant could not be removed. The enormous admeasurements must needs have been considered surprising. The patient died early in the morning; and although the body was not opened until twelve hours subsequently, the viscera were quite warm, and in the larger vessels the blood had, after so long a time subsequent to dissolution, in a great measure retained its fluidity. Dr. Bright said the greatest girth of any patient he had ever known was seventy-two inches; in this it was seventy-seven inches. On making the longitudinal incision, the knife was followed by a considerable quantity of clear, straw-coloured oleaginous fluid, which, on minute inspection, trickled down from the fatty surface for some time after the section had been made. The light fawnish-red colour of the muscular tissue, the extreme coarseness of its texture, also the unnatural flabbiness of that tissue, were of pathologic significance. All writers on obesity have noticed the paleness and softened condition of the muscles. It is owing to this change that their contractile power is diminished, and why very fat persons are not strong in proportion to their entire volume; again, in some measure to the same cause is attributable why the obese ever complain of shortness of breathing and palpitation. Fatty degeneration is sure to give rise to dilatation of the heart's cavities, resulting from diminution of muscular tonicity.

When the muscular fibrillæ morbidly assume the fatty change, impediment must be given to their functions, not only by increase of volume preventing their perfect apposition and co-operation, but from their less resistive power, and to the obstruction such gives to the proper capillary influx of their normal and only stimulus, arterial blood. The sarcolemma is supplanted by oil globules, the fundamental cause of the fatty degenerative waste. Therefore, such resistive power being diminished, longitudinal extension results; hence is a cause of parietal dilatation of this organ, and in an exact ratio with the sum of such dilatation, is a greater inpouring of blood into the cavities, and the subsequent increase of organic power required to efficiently and continuously empty the cavities, and propel the enlarged volume of blood into the great vessels; therefore, it is incontrovertible that loss of muscular contractile tone in hollow organs from this, as any other cause, must be succeeded by caviteal expansion. Again, the vast increase of the bulk of the body influences the circulation by an enormous increase of the capillaries, but the heart-power remains the same. Dilatation ensues from augmentation of capillary blood, and hypertrophy is needed to empty the enlarged and surcharged chambers. The venous tracts are congested, and hence the common sequence in obesity of transudation. Hippocrates observed that the blood-vessels in fat people are, as compared with the body, small. This still holds true regarding those to be seen by the naked eye, but as now is insisted upon, the minute branches and the capillary system are very greatly increased. These pathological facts explain the often declared statement, that the

majority of the obese die from dropsy and cerebral coma. Of fifty-seven deaths in the obese, fifty had fatty and diseased hearts. In thirteen there was hypertrophy of this organ; in twenty-six dilatation; and in eleven there was atrophy. There is another way giving rise to similar pathological results that may be here incidentally mentioned; where muscular fibrillæ themselves are not the prime causation by morbid conversion into another, and anormal substance, as in the adipose degeneration. This is by a loss of nervous influence, when the lesion is primarily located in the nervous centres, especially in the motor properly so called, which is well illustrated in instances of paralysis, where the bladder becomes preternaturally distended; in chronic atony of the uterus; and, according to Abercrombie, in ileus, which that physician contended was the prime cause of obstruction in the case of ileus.

In the examination of this organ, in the above inspection, when it was laid on the table, by its softened condition, its formative consistence was so far lost, that it collapsed upon itself, and assumed a placental-shaped mass. Respecting the hypertrophied state of the walls, their thickening was to be anticipated, not only because there was a general hypertrophy of all the tissues, but also on physiological grounds, because, wherever there is a gradual demand for increased functional action in an organ or organs, enlargement of structure is commensurately necessary, in order to meet that demand resulting from excess of action in such organ or organs; and, of all other tissues, this more particularly applies to the muscular. Sometimes in obese subjects the heart has lacerated, a circumstance noticed by Williams, who cites an example of the kind from M. Bertin, and relates the fact of the late Dr. Higgins, of Dublin, the discoverer of equivalents in chemistry, who died from this cause. He says he had seen the heart more than half covered with fat; the adipose tissue of the base and surface having encroached on the muscular fibres, so that at the base and along a greater part of the wall of the right ventricle, and at the septum of the ventricles, these fibres only formed a thin stratum irregularly terminating in the adipose tissue. Laennec describes this state of the heart, and says that the fatter the heart is, the thinner in general are its walls; and, on cutting into them, the scalpel seems to reach the cavity without encountering almost any muscular substance, the columnæ carneæ appearing merely as if bound together by the internal lining membrane. The organ in this case was not thinner in the manner described by Laennec; yet still, from having acquired such large dimensions, and the muscles being pale and flabby, the additional power required to expel the large volume of blood contained in its ventricles, such an event as rupture might not have been an improbable result.

Haller was one of the first to describe the conversion of muscle into a fatty substance, and Vicq d' Azyr more lucidly pointed out the morbid change. Corvisart had a just conception of this degenerative transformation of muscles, and he showed how it may obtain in the

heart-wall, and how such always means diminution of power. Rokitsky in speaking of it says, it may extend through the entire thickness of the heart-wall, though not uniformly in all parts; that this granular formation on and between the muscular fibres marks the intensity of the disease; and that the microscope shows an accumulation of black and dark outlined globules which are fat, the muscular fibres having lost their striæ, and the fibrillæ having been broken down into delicate molecules. Paget has gone further, and has demonstrated that there is a disappearance of the nucleus in the fibres, and that oil globules occupy the intra-sarcolemmous site. The sarcolemmous elements become abolished. Quain and Ormerod proved how there might in the same case co-exist both molecular and vesicular fat. The former remarks that the fibres, though overwhelmed with fat, may still retain their organization, and the latter narrates an instance in which the heart was overlaid with fat, but separated by a distinct boundary from the muscular substance, which had passed molecular conversion. Handfield Jones asserts that the first step in the formation of fat is the separation of oil-drops from the plasma, which coalesce and become enveloped by a film of proteine matter, and from causes unknown the separation of oil from the plasma takes place *within* the fibre itself, or the oil may occupy the interstices of the fibres, and undergo the lowest grade of organization, that of becoming fat-cells.

The liver was from one-third to one-half larger than normal, and its substance had assumed that light fatty complexion which is familiar to the morbid anatomist, as being met with not merely in cases of obesity, but in instances when that organ is the chief lesion. I have often seen the same change in the parenchymatous structure of this organ, in autopsies made in the pathological theatre of the Edinburgh hospitals, and in most of these instances such was in the bodies of confirmed dram-drinkers. The appearance of the spleen, its considerable congestion, the semi-diffuent consistency, and other pathological conditions might have been expected where there was enlargement of the hepatic viscus; and, although it has been my lot to make a considerable number of autopsies, yet in no instance do I remember congested liver without congested spleen. All writers on splenic affections have insisted upon the great sympathy which there is between these organs. The spleen may be much beyond its proper size, without almost attracting the notice of the practitioner during life; its mere congestion giving rise to no sympathetic disturbance. The granular degeneration of the kidneys had progressed to a greater change than might have been anticipated from the comparatively insignificant amount of albumen discovered in the urine; and I have often known far more functional disorder associated with less structural change. If fat be formed by a secretory process from the blood, and as we know that hydrogen is its chief elementary constituent, it follows when, from whatever cause, there is an abnormal increase of hydrogen

in the body, that the preternatural accumulation of fat must be produced, because there is no emunctorial set of organs sufficiently active to carry it off in a due degree; unlike what is the case when carbon is too abundantly generated, when the lungs form an outlet; or where azote is too greatly formed, when increase of action in the kidneys averts those evils that might otherwise accrue in the system. The three great excrement functions, namely, those carried on by the lungs, liver, and kidneys, undoubtedly are highly dependent upon the perfect action of each other in preserving a natural condition of the blood, that is a proper proportion of its constituents, so indispensable in the reparation of the tissues; and when there is excess or deficiency of one of the main elements entering into the formation of these, carbon, hydrogen, and azote, the balance of function in secretion is maintained by the other two; but with regard to hydrogen, it appears the deposition of fat relieves the blood of hydrogenous excess: thus, presuming upon disorder in these secretory actions, the kidneys might be inordinately exercised, and thus structural change the consequence, because whenever there is disorder in the circulatory function, the kidneys are of all other organs most likely to become in one way or other affected in such change. The small size of the uterus and ovaries is quite in accordance with what has already been advanced respecting the influence of the generative organs in the obese; that is, that their frequent exercise being, from the irritation produced in the system, opposed to the obese diathesis, that obesity is most likely to come on when sexual irritation is on the decline, and thus the removal of the testes and ovaria, by the repose which is given to the system, inclines to the deposition of fat.

From what has been already observed it is evident that the doctrines now maintained relative to this disease incline to the humoral pathology, and that such view, extending to other diseases also, is becoming more established; and if we are to regard the formation of an inordinate deposition of fat, as I have endeavoured to show by the foregoing statements, it is manifest that the lesion principally and fundamentally exists in the blood, and to oppose and diminish carbonaceous materials in the system, is the rational mode of procedure. Before pronouncing the opinion that a patient is morbidly obese, the height and age are to be considered. The results of Hutchinson's very extensive tables should be held in mind. The calculation fixed by that authority is, that the proper weight of a person sixty-one inches high is one hundred and twenty pounds, and that for every additional inch of stature, five pounds in weight should be added. Again, infants, children, and adolescence need an undue amount of the fatty tissue as compared with adults, and in middle life there may, as previously remarked, be a tendency to corpulence with veritable health. There may be deposits of fat on the heart, which give gravity to a case disproportionate to the general degree of corpulence, and in all such instances the means of physical

diagnosis should be rendered available. Before the adoption of any system of treatment, the condition of the patient should be well reflected upon. It is important to note the state of the vital powers; the capacity of the digestive and assimilative functions; the kind of complications which may subsist; to judge as to whether its abnormal genesis in the body be mainly attributable to a congenital tendency or to subsequent, acquired, and preventible habits, and especially to the age of the patient. The heart-force should be well estimated, and the urine tested as to the state of the kidneys. When there is a resistless flabbiness of the tissues with a feeble radial pulse, diminished præcordial impulse, and it may be dilated cardiac cavities, our treatment should be regulated accordingly. It must be remembered how large is the relative number in which heart disease in one form or another obtains in the obese; and muscular change, the loss of normal muscularity, enlarged chambers, valvular incompetency, and reduced dynamic contractility are the common concomitants. Again, the respiratory action is performed in more lowered and difficult manner, and often a degree of depression and weakness prevails. In carrying out any extended course of remedial measures, the general vigour should be watched, and the reduction of the patient's volume be considered. Sudden reduction is not without danger, as the heart's failure might supervene, or congestions or effusions come on by impaired vitalism and vascular turgescence.

It is quite true that some writers have advocated moderate venæsections, and in certain and very exceptional cases the abstraction of a small quantity of blood would be a rational expedient, and warrantable on physiological and pathological principles. An obese patient might be seen in the middle and vigour of life, with largely developed vascular system, with a hypertrophous heart and an augmented præcordial impulse; in whom there might be co-incidentally the tendency to pulmonary and cerebral congestion; and whose lips and face, with dyspnoea and giddiness, proclaimed the stress and danger of an oppressed circulation. To relieve at once and effectively, the surcharged and labouring cardiac cavities, and the systemic vascular repletion, might avert the sequential occurrence of rupture and disorganization. Bloodletting could only be justifiable under such circumstances. An example was related to me, relative to an obese lady, of whom I know she has cardiac dilatation, and she, also, had albuminuria. She was of a light and fair complexion, and the muscular system was resistless and flabby. With some suddenness her heart became greatly oppressed and well-nigh baffled in its action. The face was livid, the voice feeble, the surface became cold and clammy, and pulmonary obstruction pointed to the extreme peril of her condition. There was indubitably no time to be lost. The family medical attendant was hastily summoned. It was better to act in opposition to the theories of a fundamental pathology, and to the modern extreme fashion and invariable practice, than allow

the patient to die. With much acumen and sound judgment he instantly opened a vein in the arm. The loss of blood gave momentary relief. The heart now began to act with more freedom, and fuller and freer; the breathing became easier, and the facial indication at once improved. A rational law in animal mechanics had been brought into timely and speedy operation; impeded and labouring organs had been lightened and made capable to the exercise of their functions, in the discord of theory, and, as it were, in the warranty of an exceptional empiricism. An eminent London physician was sent for, and he declared that wisdom and promptness had doubtless saved the lady's life. The occasional recourse to the lancet is, even in these days, wise and salutary. It is not for a moment to be advocated under the old and erroneous conception of being an agent to cure, in the sense that we now sometimes apply that term to the offices and capabilities of certain drugs and remedies, but as a speedy means whereby an overcrowded circulation and distressed vital organs can mechanically be relieved from dangers, or it may be fatal eventualities.

It has been transmitted to us from the hoar of a remote antiquity that the Egyptians had their *ars pinguis faciendi* and their *ars attenuandi*, and it is supposed the latter was practised by the administration of acids. Fleming, who wrote on this subject about a hundred years ago, speaks of the advantageous use of vinegar. There is no doubt the mode in which acids act is by disordering the digestive organs, and thus depriving the body of a proper amount of healthy chyle; and in the training and thinning of certain of the lower animals, articles are employed which merely have the same effect. Chambers, following the opinion of many other authorities, seems to have the most confidence in large doses of the officinal liquor potassæ, to be given in milk in half-dram, or dram, and a dram-and-half doses, three times a day. Line-water has been prescribed in a similar way. Alkaline solutions have been applied to the skin, it is stated, with marked benefit. Various tonic medicines have been tried with a view of improving the tone of the digestive organs, and thus hastening chimification, as quick digestion is by some regarded as opposed to the formation of fat. Duchesne Dupare recommends a decoction of the *Fucus vesiculosus*. He orders from two to three scruples daily, and says it produces diuresis and emaciation. In former times this remedy was employed in scrofula and bronchocele. There is no doubt that moderated action on the kidneys and periodic and regulated purgation are in most cases to be rendered available. In all these instances there is increase of fluid, as there is of fat. It is well known that the obese drink a great deal, and even much water carried into the stomach is supposed to contribute to the production of this substance.

The dieting of these cases holds out more hope of relief than any medicines which can be selected. All foods and drinks allowed should be written down, and accurately weighed and measured.

Rapid digestion is in every way to be promoted, in order that the fatty genesis may be opposed. Three meals may be allowed. The breakfast should be early, and it may consist of tea, toast, biscuit, and a little lean meat, or of kidneys, fish, and the crust of home-made bread. Dinner should be in the middle of the day, on lean meat and green vegetables, of poultry, fish, and game, and two or three glasses of dry sherry or claret are the best drinks. Supper to be of meat, fish, dried toast, biscuits, and claret. These are closely the allowance of Bantingism. Fat and oleaginous articles cannot and should not be entirely excluded. All meats contain some fat, and the last named substance is not only a heat producer and a fattener, but it assists in the assimilation of nitrogenous matters, and is needed in the nutrition of the nervous system. The excessive fat producers are starch and sugar, and the more recent views hold to the opinion that all fats and oils should not be absolutely cut off. Brown bread may usefully be given, as it opens the bowels; and gluten bread, with its excess of nitrogen and deficiency of starch, when toasted, is very available. The patient from time to time should be weighed, and, as above remarked, his degree of vitalism should be correctly estimated. Much flabbiness of the tissues indicates nitrogenized food. The treatment should be gradually and continuously carried on, and if there should be any palpitation, feeling of depression, and increase of debility, an alteration or pause in the treatment becomes imperatively called for. Bantingism is the same as training in boating and other athletic exercises. It can only, as the rule, be carried on for a few months, and if protracted unduly the patient declines in power, becomes gouty, gets out of spirits, and it may be that some effusion comes on in one or another of the cavities.

In a vigorous and powerful subject little sleep and early rising should be enjoined. Brisk and long walks should be taken, and horse-exercise is much to be commended. The Turkish bath, in properly selected cases, may be ordered, with a view to act on the skin, and maintain in efficiency the sudoriparous organs. Its use, however, in those beyond middle life, and especially in those whose heart-action is feeble, is contraindicated. When it can with impunity be taken, there is no doubt it unloads the cutaneous capillaries by the aqueous transudation. When the Turkish bath cannot be recommended, the ordinary warm bath may be substituted. Friction applied to the skin by means of the horse-hair glove stimulates it into action. By regulated muscular exertion the pulmonary circulation becomes quickened, and thus there is another outlet to carbonaceous matters. The surface should not be kept too warm by the use of woollen garments, which are non-conductors. When there is mainly a local accumulation of fat in the omentum, a well-adapted belt or bandage gives great comfort; indeed those who are affected with corpulence in a more general form will find such appliances desirable, and they, also, enable the patient to take more

active exercise. In conclusion, the peculiarities and circumstances of each individual case will demand various modifications in the treatment, and in order to carry out the physician's request, not a little will be required on the part of the patient in making many concessions, in opposing a large appetite, the imbibition of fluids, and often strongly pronounced tendency to inactivity and indolence.

XXIII.

HYDRONEPHROSIS.

THE following is an account of an uncommon form of kidney disease. It is a sacculated kind of dropsy of the organ. Children are sometimes born with this malformation. A man, aged thirty-five, was admitted in the Tunbridge Wells Hospital for renal disease, his facial aspect and general appearance being very characteristic of that affection. In his younger days he had, as it was ascertained, drunk to great excess, but, during the last few years had been more temperate. He said he was a strong and healthy man up to eighteen months before, when his health began to fail, and he suffered from shortness of breath, frequent vomiting, and pain in the back. In addition to these symptoms, he was afflicted with incontinence of urine, especially at night. In spite of medical treatment, he continued to get worse, and, twelve months prior to admission, was compelled to give up work. While sitting in his chair, he had a fit, falling on to the ground, struggling and biting his tongue. The fit lasted about ten minutes, but these attacks never recurred.

On admission, he was found to be a sallow, anæmic-looking man, looking older than his age, with a very anxious expression of countenance. He was very restless, suffered from slight dyspnœa, and had occasional rigors, followed by sweating. He passed a fair quantity of pale cloudy urine in the twenty-four hours, of a low specific gravity. On microscopical examination, a large quantity of pus-corpuscles were seen, but no casts. The urine contained about a sixth part of albumen. The physical signs of the thorax were normal, with the exception of the cardiac lines of dulness being increased. The day after he came into the hospital, he was very sick, and vomited; but this symptom subsided after taking two or three doses of hydrocyanic acid and bismuth. The dyspnœa and restlessness continued in an urgent degree. One evening, three months after his admission, he was seized with a distressing attack of difficulty of breathing. The hurried respiration continued, and there was some degree of congestion in the right pulmonary base. The pulse became soft, and he gradually sank early on the following morning. The urine had been voided in normal quantity up to the time of his death.

On inspection, there were old-standing pleuritic adhesions binding

down both lungs, and the base of the right lung was condensed. The cardiac valves were healthy, but there was marked hypertrophy of the ventricular walls, verifying the diagnosis of increase of dulness at the cardiac area. Both kidneys presented a very remarkable appearance. They were large, rounded, and lobulated, and had quite lost their normal configuration. On longitudinal sections being made of both, large quantities of clear urine escaped. Some of the cystic cavities would have contained a full-sized walnut. The papillæ had become abolished in the dilatation of the calices. In certain parts, the renal substance had disappeared, or had become converted into a distensile leathery envelope. The pelves had become vast hollow cavities. The ureters were immensely dilated, being as thick as the little finger, somewhat tortuous, and they had a semi-transparent appearance, resembling the parietes of a blown-up bladder. There were no concretions, as a probe passed without much difficulty down each into the bladder. The right kidney was more prominently lobulated than the left. The bladder did not exhibit any morbid change. The stomach, intestines, liver, spleen, and other organs, did not exhibit any morbid conditions.

Hydronephrosis, as it has already been remarked, is not commonly seen, and it may be said that it is a rare disease; it has, however, by various writers been fully and accurately described. It more generally occurs in one kidney, and, perhaps, it is about correct to say that in twenty cases, thirteen or fourteen would be single, and in six or seven it would be in both kidneys. Its most notable condition is the accumulation of urine in the pelvis of the kidneys, which greatly dilates this cavity, and also enlarges the infundibulum and the calices. In addition to the nomenclature now employed, it has been called hydrorenal distension, *hydrops renalis*, *hernia renalis*, and in more ordinary language dropsy of the kidney. The enlargement of the organ goes on to very varying degrees of magnitude. In an instance recorded by Baum of Göttingen, twenty-five pints of fluid were taken from one of these cysts, and in another case, Sir Spencer Wells drew off sixteen pints of urinous, soupy fluid. The dilative process may progress so enormously that the tumour may simulate ovarian tumour, and even extend down to the pubis, and, as it were, fill the abdomen. When the complaint advances to such a degree of excess it is most difficult of recognition. The obstruction to the flow of the excretion may be at different parts of the urinal course; it may be in the urethra, the bladder, or the ureter, or within the organ itself; and in nearly all cases, inspection after death reveals the point at which such obstruction has obtained.

Many and distinct are the causes to which the affection has been referred. It may be from calculus within the pelvis, plugging up the outlet to the fluid; from pressure on some part of the ureter as by ovarian, uterine, and malignant tumours; inflammation of the pelvic cellular tissue and of the peritoneum in females, and the mechanical pressure during pregnancy may cause the complaint; it

may be from morbid states of the inner coats of the ureter whereby they become thickened, and the passage becomes narrowed or absolutely closed, and such may be the results of a foregoing inflammation; from disease of the valvular folds within the bladder, and, it may be, from chronic inflammation of this viscus or from its paralysis. Ulceration of the urinary bladder has produced it. There is no doubt, however, that in many examples the primary cause has been pronounced as being congenital. It has been computed that in all instances of hydronephrosis the etiology may be referred, in not less than one-third of the number, to congenital malformation; and curiously enough, it has been observed that this error in development has repeatedly been in association with other kinds of malformation in the same subject. When the cause commences in utero one or both ureters may be tortuous, and so twisted upon themselves as to produce pressure upon, and occlusion of, the channel; or they may have an angular bend, whereby a like effect is produced. On reference to the post-mortem now related the only abnormality was a tortuous condition of the ureters. They had become extremely dilated, so that they had expanded to the diameter of the little finger. Some writers state that they have seen the ureter enlarged to the magnitude of the small intestine. By this dilatation it is very probable that their former tortuosity, relatively, became less marked, and that the continuous surcharge and pressure of the fluid had tended to straighten them. Infants are sometimes born with a large abdomen, simulating ascites. Dr. Hillier some time ago described an instance of this kind. The affection was not recognised until the child was four years of age; the tumour had then acquired the dimensions of a large cyst, which sprang up in the right iliac region, and which was tapped, one hundred and two fluid ounces of non-albuminous fluid being drawn off, which had the character of dilute urine. That authority records a case of single congenital hydronephrosis in a woman who lived until twenty-three, and, also, the instance of a boy, in whom the affection had dilated both kidneys, but who lived until the age of seventeen. Dr. Hare has given the full details of an example of this kind in a woman, who died at thirty-eight, who doubtless had hydronephrosis at twelve, and in whom it is exceedingly probable that it was congenital. The opinion has been advanced that hydronephrotic dilatation may be commenced in the latter month of intra-uterine life by imperforate urethra or impervious ureters. And latterly physiologists are inclined to believe that during the later period of gestation, the urine of the fœtus presses into the cavity of the amnion, and hence the secernent and urinary organs are freed from the accumulation of the renal secretion. The experiments of Claude Bernard go far to the establishment of this theory.

Those parts of the renal cavity where the lining membrane has the least power of resistance are most prone to become dilated, and hence it is that the calices are the first to expand; in the process of

time, and as absorption of the organ's substance takes place, the pelvis and infundibula yield also to the internal pressure. In the course of those structural changes which eventuate, the outlets of the tubuli recti and papillæ become closed, and the papillæ themselves become compressed and disorganized, but the lining membrane of the pelvis and calices continues to secrete mucus and urine, and hence this abnormal storing up of the fluid. When these morbid alterations go on to extreme degree, gradual atrophy, and the abolition of the organ's substance, result. Rokitsansky says that in cases which have not made such progress, as often occurs in the tendency of the disease, that the papillæ may only be shrunken, hardened, and leathery; and that in extreme examples a lobulated membranous sac with cellular cavities is discovered, the walls of which may be thinned to the thickness of only two or three lines. When the disease has long subsisted, the medullary and cortical substance may have been so acted upon and absorbed, that little remains of either; and it has been noted in extreme instances that no trace whatever of the renal substance could be detected. It has also been remarked that the dilated calices give rise internally to cellular formations, but in old standing cases, even these septa disappear, and one large and uniform cavity is the result. In the case above described, the septa had in part disappeared, and in certain of them a mere cord-like band could only be traced. The walls of these dilated sacs, when carefully examined, exhibit all the conditions of a tough, dense, vascular, fibrous tissue, and through the irritation produced by their mechanical pressure on surrounding organs and parts, effused inflammatory products give rise to greater or less amounts of organized adhesions. And, in those cases in which the hydronephrotic tumour has acquired very large magnitude, there may be such a degree of mechanical pressure on the bowels as to produce obstruction, and thus to give rise to the gravest results, just as in ovarian tumour, or in fibrous tumours of the uterus. Again, the urinary bladder may be encroached upon, or intervisceral abscesses may be formed.

The contained fluid is nearly always more or less albuminous. It is often clear, yellowish, of low specific gravity, and it may be of alkaline reaction. Urinary solids can, though in very limited amount, mostly be detected. Sometimes there are the admixtures of blood, a glairy secretion, and it may be that there is the presence of pus, and thus instead of the liquid being clear it is cloudy and turbid. In the case related by Dr. Hare, the fluid had an urinous ammoniacal odour; it was of a dirty, darkish amber colour; it contained albumen, was slightly turbid, and had a specific gravity of 1017. The general appearance of the secretion is greatly determined by the quantity which has been accumulated.

In double congenital hydronephrosis, the child rarely lives long after birth, but in certain exceptional instances the patient has attained adult age. When only one kidney is affected the other organ takes on compensating action, and life may be prolonged to an

indefinite period; and if the tumour is not large there may be no physical signs, nor may its existence be even suspected. The tumour, when first noticed, resembles other forms of kidney enlargements at the lumbar region, but in cases which go on to great magnitude it extends to the iliac and hypochondriac regions, and in extreme instances it so fills the abdomen as to render its nature most difficult, if possible, of diagnosis. It may be considered as ovarian dropsy or ascites. In the earlier stage of its increase, it feels lobulated to the fingers, and gives the sensation of encysted fluid; when the abdominal parietes are thin, distinct fluctuation may be felt. It sometimes occurs that there is suddenly an enormous quantity of urine voided, when the tumour becomes so greatly reduced as to almost, or it even may be entirely, disappear, and a fact of this kind points very significantly to the true nature of the disease, and may be regarded as pathognomonic. In double hydronephrosis, and when two lobulated elastic tumours are present, it may happen that one by a large voidance of urine may collapse, and not the other. There is, when such rapid emptying takes place, momentary relief to the pain, and comparative comfort in the affected side, until the reaccumulation of the secretion. When the tumour is tense and full, the percussion note is dull and dead; and when not of extreme size, the dull area is surrounded by an immediate border of resonance. The colon is in these examples not unfrequently distended; hence the dull and resonant lines are very perceptible. Constipation consequent upon mechanical pressure is often a symptom; or the irritation may give rise to occasional attacks of diarrhœa or a continued flux of the dysenteric character, and sometimes nausea and vomiting are persistent. When such cases end fatally, the end is mostly ushered in by all the ordinary phenomena of uræmic poisoning. Rupture of the sac would, of course, be followed by flagrant peritonitis and speedy death.

When hydronephrosis is small it cannot be diagnosticated, and it is only when the tumour becomes palpable that it may be suspected. The various other lesions, to which this organ is liable, never attain the large size to which this affection may progress. In abscess, the accompanying symptoms, the acuter characteristics, and more general and disturbing conditions would be our guide, and indicate another state of things. In malignancy, the growth would not be so large as to simulate the hydronephrotic change, and the cachectic expression would infer the presence of cancer. The resemblance to ovarian cyst and ascites has already been observed. Hydatid disease is most rarely on both sides. As I have remarked, single hydronephrosis may for a long period go on without exerting any great ill-effects on the system. In double hydronephrosis death by uræmia is the most usual termination. The treatment is almost exclusively surgical, and paracentesis by the aspirator is well-nigh the only means which can be had recourse to with any hope of relief. This alternative may in repetition be demanded.

XXIV.

HÆMATOCELE CONNECTED WITH THE LEFT KIDNEY.

THIS term, as more commonly employed, signifies an effusion of blood beneath the peritoneum in the immediate vicinity of the uterus and its appendages. By surgeons it is used to denote a sanguineous extravasation into the tunica vaginalis in consequence of injury. Here it is given in association with the kidney. The subject of this disease which came under my notice was that of an emaciated woman, fifty-one years of age. The symptoms during life had been very equivocal. A tumour, the nature of which could not be made out, was found extending from the left iliac fossa to the left hypochondrium, and as far inwards as the median line, the heart being pushed towards the right side, and the left side of the chest being somewhat protruded. The urine, on being tested, showed no morbid products.

On post-mortem examination, the left kidney was found considerably diseased, the superior portion of the capsule having expanded so as to become lost in the walls of a large tumour of somewhat aneurismal character. And the appearance of the upper part of the kidney was such as to lead to the inference that it had been originally lacerated.

It need hardly be observed that during life the true nature of such a tumour could not be foretold. The diagnosis of abdominal tumours, even with the most experienced physicians, is often beset with difficulty and uncertainty; and in so very exceptional a pathologic condition as that now recorded, the enlargement could only with vagueness be surmised. When hæmorrhage is the cause of such an abnormality to palpation, the suddenness of the extravasation and the pressure and tension excited in the serous covering are such as generally to be followed by local or more diffuse peritonitis. The symptoms of acute inflammation quickly succeed the formation of the tumour. In abscess the enlargement is gradual, and the peritonitic symptoms may either not exist, or in so marked or modified a manner as not to attract attention. The clinical history may yet be such as to throw some light on the cause of such an affection.

XXV.

URÆMIA.

IN some cases of uræmia, which came under my observation, and which assumed the typhoid condition incident to that disease, I have been much impressed with the resemblance of certain morbid phenomena to those characteristic symptoms so common to two of the forms of continued fever, to typhus and typhoid. Sometimes it is difficult to distinguish the conditions of uræmic poisoning consequent upon renal lesion from the symptoms of the specific fevers now named. That mistakes in diagnosing these affections sometimes occur is generally admitted. And when it is considered how the essential distinctions may be obscured from negative as well as positive facts in some examples which are presented to us, it is, then, less improbable that our deductions may be erroneous. Most men of experience can call to mind instances when it was debatable within themselves as to whether the complaint under consideration were typhoid with pneumonic intercurrent complication, or the typhoid state of pneumonia. Just as we sometimes find it difficult to say whether it be enteric fever, or some dysenteric disease attended by such symptomatic fever; or again, in the maladies of children, when cerebral and thoracic or abdominal lesion co-exist, to proclaim which is the primary and which is the secondary affection. In returning to the question of the likeness between uræmia and the two specific fevers, I have discussed this matter with two of my professional friends, both of whom were most competent of giving an opinion on this particular point in pathology. Sir William Jenner said to me, "There is doubtless often much difficulty in deciding between the two." Dr. Murchison told me he "frequently found it no easy matter to arrive at the right conclusion." The last named physician, in his well-known work on fever, writes:—"Every practitioner must have been struck with the remarkable resemblance between a case of typhus in its advanced stage, and one of uræmia dependent upon renal disease; in fact, the two affections are often mistaken for one another." Again, he asserts that cases of uræmia are not uncommonly sent into the Fever Hospital as cases of typhus. I have selected three instances from my note-book illustrative of the proposition now advanced.

CASE I.—The house-surgeon requested me to see a young woman whose case he thought one of continued fever with renal complication. She had been ill several days when I saw her; had had diarrhœa and vomiting; there was albuminous urine with a few blood discs, but no casts. No cutaneous eruption. The frontal headache, lumbar pains, and muscular tremors proclaimed the implication of the great nerve-centres. But I will pass on to a couple of days prior to her death. She then lay on her back with a tendency to slide down into the bed. There was the wakeful, broad-eyed stare, coma-vigil. The skin was not moist; the lips and teeth were parched and covered with dark sordes, and the tongue was brown and dry. There was some tympany, and the bowels were confined. She had had low-muttering delirium during the night, and, unless roused, she dozed off into unconsciousness. In fine, the typhoid phenomena were in marked degree exemplified. The temperature was 97. She died comatose on the seventeenth day after the house-surgeon's first visit.

CASE II.—I was called to see Mrs. R., a person of more than middle life. It was reported that for a week she had been unwell. She had had pains in the back, rigors, headache; had felt muddled. She was in bed when I saw her. The eyes were injected, the lips dry, the tongue coated, the bowels were confined, and there was some tympanitis, but no right iliac tenderness, and no maculæ. There had been no vomiting or purging. Pulse 102, respirations 24, and temperature 98, some albumen. Head symptoms increased, she became delirious, slid down in bed. Dark sordes covered the lips and teeth, and the tongue became dry and brown. Urine passed involuntarily, and she died on the fifteenth day of her illness with all the objective symptoms of cerebral effusion.

CASE III.—I was called to an elderly lady, who had been ailing for about a week. On the first day of my visit she had rigors, lumbar and articular pains, headache, and could not sleep. The skin was harsh, the tongue dry, the pulse 120. No lenticular spots, nor other eruption. The symptoms became more grave; the pupils were small; the head was more affected; she became incoherent, and passed into low-muttering insensibility, lying on her back and falling down in bed, and there was tympanitis. Temperature about 98. The urine was voided unconsciously, and there had been no vomiting or diarrhœa. The lips and teeth became covered with dark sordes, and the tongue brown, fissured, and dry. She died at the end of the second week of her illness, with the most marked typhoid appearances.

To hastily glance at some of the cardinal symptoms in these cases. In the first there were in the earlier stages sickness and vomiting and diarrhœa; but sickness and vomiting and diarrhœa in advanced uræmia are not pathognomonic of that disease, though they are common accompaniments. About one in every ten cases of typhus has vomiting. In enteric fever about thirty-six per cent.,

or more than one-third, have these symptoms. In relapsing fever vomiting constantly occurs. And as to diarrhœa, towards the end of typhus liquid stools sometimes come on. In enteric fever diarrhœa is the rule, not the exception. M. Barth observed it in ninety-six out of one hundred and one cases in Paris. Then it might be said:— But the lenticular spots or measly rash would distinguish the one or other form of fever from uræmia. The reply is, they are by no means uniformly present. If they invariably appeared the diagnosis of these affections would be easy enough. According to Murchison, in twelve per cent. of enteric cases there are no circular rose-red spots. Of 3,506 cases of typhus admitted into the London Fever Hospital, eleven per cent. had no rash at all. Then as to the pulse. In the three cases I have given it was about a hundred. In one instance it ascended to a hundred and twenty. Of a hundred cases of typhus recorded by Murchison, in nineteen it never reached a hundred. The same authority says enteric fever may be fatal, and the pulse never count a hundred. In eight fatal cases by Louis it never exceeded ninety. In these three examples they all lay on the back, fell down into the bed, had dark sordes, and brown, dry tongue, precisely as in typhus. Some might say, But in all these was *albumen*, and that is the cardinal characteristic of renal disease. The answer is that, according to Murchison, Jenner, Johnson, and Gull, albumen is not uncommon in typhus. Austin Flint, of America, found albumen in seven out of nine cases of typhus. Sidy, of Edinburgh, “frequently saw it in typhus.” Continental physicians observe this symptom. Oppolzer and Wunderlich give the same kind of testimony. Parkes discovered albumen in one-third of his enteric patients; Martin Solon in twenty-one out of fifty-four cases; and Becquerel in more than fifty per cent. In the article on Relapsing Fever I stated that urea was to be detected by analysis in the blood and in the serum of the cerebral ventricles; and since then other observers have in like manner found this product in the other two types of continued fever. To add to our ambiguity, in some cases, typhus may occur, where there has been foregoing renal disease; and, too, in some examples of kidney disease, as in contracted kidney of long standing, there may have been no anasarca, no diarrhœa, no vomiting, no contracted pupils, and where the albumen is in small quantity and the comatose symptoms by no means gravely pronounced. Another comparison before I cease to draw these parallels. The cases I have given died just about the time when typhus cases die, namely, the first on the seventeenth day; the second on the fifteenth; and the third at the end of the second week. Of large averages in the fatality of typhus the majority die on the fourteenth or fifteenth day.

It may well be asked, are there any symptoms; is there a symptom really pathognomonic of uræmia or typhus, upon which reliance can be placed, and which would throw such light amid the obscurity of the facts as to guide us into the right decision? I think an affirmative reply can be given.

If in uræmic toxæmia we could get a clear history of the case, and knew the presence or absence of a certain train of symptoms before those of acute character became manifest, much help in diagnosis would be derived. But the comparisons which I have drawn are rather between the latter symptoms of this disease and the latter symptoms of typhus. In uræmic toxæmia the brain and spinal cord are directly affected, mainly by the non-elimination of urea. The great nerve-centres become fatally depressed in their functions, and the arrestment in the functions of the pneumo-gastrics is the proximate cause of death. When originating in chronic lesion of the kidneys, inflammation may have left organic change. Their intimate structure may have become spoilt for the proper performance of their secretory office. There may have been extensive desquamation of epithelial cells, and the tubules may have been blocked up with an amorphous granular deposit; and thus effete and noxious matters would in redundancy be left in the circulation. In such instances the toxæmic effect is ultimately produced. In fever, the accumulation of these matters is much more rapid, and may in another manner be accounted for. But what is fever, it may be asked, as bearing on this particular part of inquiry? Galen said, in the second century of our era, that its essence consisted in a *calor præter naturam*—in truth, in a degree of heat in the organism above the physiological standard; and this lemma of Galen's, enunciated so far back in the hoar of a remote antiquity, has not only held good amid the mystic philosophies of the Middle Ages, and survived the dogmas and doctrines of the older physicians, but it stands out still as the great and abiding distinguishment of fever. The researches of modern chemistry, and the experiments of cotemporaneous physiologists, have confirmed its correctness. Virchow and Traube declare the essence of fever is the elevation of temperature, which gives rise to tissue change, and thus alters the nervous system. The experiments of Bernard and Waller, and of Volkmann and Fowelin, have gone to prove that the sympathetic ganglia and the vagi are partially paralysed in fever. And here our knowledge of its fundamental pathology stops. But we know that this condition of the great nerve-centres is followed by certain sequents, which go far to explain the phenomena of death. It is not alone the specific poison—the fever stuff—or, to speak in the more learned language of Eisemann, the pyretogen, which kills. The action of retained deleterious matters upon the nervous centres is succeeded by quickened circulation, increased heat, and a retrograde metamorphosis of the tissues. In fine, there is excessive deorganization of nitrogenous substances; hence the rapid waste in fever. Urea and other products are in morbid abundance thrown off, and the kidneys cannot eliminate these poisonous agents. In uræmic toxæmia and in fever there is this great similarity as to the way in which death is produced. The culminating fact from what I have said, is one of weighty clinical importance. In uræmia, as the rule, the temperature is not above, but below the normal standard. In

none of the cases I have given did it exceed ninety-eight. In fever the temperature is always in some part of its course above ninety-eight. I have known it ten degrees higher. The sense of touch is not to be trusted in judging upon this point. The thermometer is alone to be relied upon; and in some examples it is only by its aid that we can arrive at a correct diagnosis of uræmia. Finally, in a very large majority of typhus, enteric, and relapsing cases, the characteristic eruptions of these specific fevers point to a correct decision.

XXVI.

CHRONIC ULCERATION OF THE URINARY BLADDER, WITH HÆMORRHAGE.

THE subjoined account gives the details of an interesting case which came under my observation. An agricultural labourer, seventy-three years of age, of middle stature, and well-developed muscular system for his time of life, with pale and sunken features, complained of frequent desire to micturate, which act was always attended with pain, little of the secretion being passed, and this was often mixed with blood. When he presented himself at the hospital, there was great distension and also dulness over the hypogastric and pubic regions. There was no fluctuation. The catheter passed without difficulty, and, on entering the bladder, it felt as if penetrating a loose and easily lacerable mass, or a thick viscid substance. No fluid escaped except a little blood. He complained of no pain when quiet. He was ordered a dose of castor oil, to be placed in a hip bath for twenty minutes, and to have an anodyne draught. It was stated that several months previously he had received a violent blow over the hypogastric region by running forcibly against the corner of a low door. For many weeks after that accident he did not pursue his ordinary occupation. For a month previous to the time I first saw him he passed blood frequently, and in varying quantities. The next day the catheter was again introduced, and it seemed to pass through some substance offering a slight resistance. Some fluid dribbled away, consisting of blood and urine. He complained of no pain, and had little desire to micturate. The pulse became weaker, and the general symptoms more alarming. Every three hours he took a dose of lead and opium. In the evening he was much in the same state. The following morning he was reported to have slept continuously during the night. Several fits of an epileptic character came on, and he sank within twenty-four hours.

The inspection was made on the third day after he died. The surface was blanched, and there were no signs of emaciation. Both pleurae were extensively adherent. There were no signs of pulmonary disease, with the exception of some amount of emphysema. The heart was large; the left ventricle was two lines

thicker than ordinary; the right ventricle was capacious, its wall attenuated, and its external surface was covered by a thin layer of fat. The adipose matter was superimposed, and the parietes were not in the condition of fatty degeneration. The edges of each aortic valve were thickened by calcareous deposit. The other valves were healthy. The bladder was enormously distended. On introducing the catheter no fluid passed. A puncture was made high up in the organ, when a pint of clear urine was removed, and other four and a-half pints of blood and urine and coagula were taken away. On introducing the hand, an irregular, softened surface was felt, extending over the left side, and to the sphincter vesicæ. Examined *in situ*, a small orifice, admitting the little finger, could be felt, opening into a separate cavity, which proved to be equal to containing a small orange. On pressing this two or three ounces of blood flowed out. By turning the viscera aside, both ureters were brought into view. The left was tensely distended, and nearly as thick as the little finger; a small slit was made near its junction with the kidney, and the contained fluid consisted of limpid urine. A gum catheter was straightened, and made, without any obstruction, to pass into the bladder. The right ureter was not dilated. The bladder was then removed, and, on being freely laid open, extensive disease was manifest, consisting of considerable thickening, at some places to the extent of seven or eight lines, and presenting an ulcerated surface, on which was only a little purulent matter. On manipulation no notable hardness was felt. The sacculated cavity spoken of was found to have a lining membrane possessing all the characteristics of that of the bladder when in a healthy condition. The prostate gland was healthy. On careful examination of the diseased mass no bleeding orifices could be traced. The left kidney was much smaller than the right. On being cut open its pelvis was distended with clear urine. The calices and infundibula were considerably dilated. The cortical and tubular substances were greatly absorbed, and the papillæ ill-defined. The right kidney was in all respects normal.

The considerable thickening of the bladder at the seat of ulceration, the bluish, roughened surface, the induration at several places, the streaks of purulent matter, and other features in no slight degree resembled carcinoma. But there were certain negative facts opposing such opinions, especially the unaccompaniment of cachexia; the non-appearance of wasting; the absence of pains throughout the progress of the complaint; and the healthy condition of adjacent organs, some of which are almost invariably involved when carcinoma of the bladder exists, especially the rectum, the prostate gland, the vesiculæ seminales in males, and the uterus in females. In some instances the submucous tissue of the vesical parietes of the fundus or near the neck is the first seat of malignant change, although the neighbouring organs are seen in normal character. Such cases are, however, exceptional. On laying open

the sacculated pouch before described, its lining membrane was found quite healthy. This separated part of the viscus has by some authors been named a vesical hernia; by others a diverticulum. These diverticula may also be congenital. The manner in which this had been formed was doubtless by disease, by the apposition and ultimate union of ulcerated edges, which had gathered up a fold of the vesical wall, and the orifice had been kept patulous by the passage of urine into and from the bladder. Mr. Bowman, of King's College Hospital, examined microscopically portions of the diseased product, and confidently pronounced these as not being malignant. The disease was simple, indurated, ulcerated thickening. Its continuance for a long time had greatly increased the width of the walls. By the large extent of the hæmorrhage a good illustration was given in the fact that very copious losses of blood may take place into the vesical cavity from very minute vessels. Another remark might have been made, viz., that the left kidney had become disorganized by the accumulation in the ureter, the reflux, and pressure by which such was followed.

XXVII.

EXFOLIATION OF THE BLADDER.

EXFOLIATION of the bladder is rarely met with; there are, however, several cases recorded of the affection. It may occur in the male as well as in the female, but more examples have been given in the latter than in the former sex. It would seem from what can be gathered from the literature of the subject that retention of urine is the frequent, or it may perhaps with more correctness be said, the well-nigh invariable cause of the complaint. The irritation induced by the altered condition of the secretion and by repeated or continuous distension doubtless keep up a chronically inflamed state of the mucous lining; and thus exudative, plastic materials are thrown out which assume a formative consistence, and take on a more or less degree of organization. This was an instance in which there could possibly be no mistake as regards the derivation of the mass. The then house-surgeon, Dr. De Havilland Hall, saw it pass out of the bladder. The following clinical details cannot but be regarded as interesting.

M. B., aged twenty-eight, married, the mother of three children, was admitted into the Tunbridge Wells Hospital on April 14th. On the 9th she had gone to bed apparently well. In the middle of the night she awoke up and tried to pass urine, but was unable to do so. The next day, at noon, a catheter was introduced, and the urine was drawn off. Retention continued until her admission. The secretion was fœtid, and contained a large quantity of mucus. On admission, she complained of great pain over the pubic region, accompanied by straining and a constant desire to micturate, but all attempts to do so were ineffectual. After she had been in the hospital about half-an-hour, Dr. Hall was hastily summoned to the ward, as she had declared that "something within her had broken." On introducing the finger into the vagina, the legs of a fœtus were felt protruding, and in the course of an hour a fœtus of from three to four months was expelled. The placenta came away three hours afterwards. The patient was soon able to pass urine. During the next three or four days she had incontinence. The urine was very offensive, and contained a large quantity of mucus. Twelve days subsequently to admission, she was seized with great pain over the pubic region, which was only partially relieved by grain-doses of opium. On the

morning of the 20th the house-surgeon was again hastily called to the patient. She was in excessive pain, and the cause of her suffering was ambiguous. Digital examination felt a substance being expelled; and visual inspection showed a mass of something in the process of being passed through the meatus urinarius. It was a membranous substance; it felt resisting and organised. After the lapse of half-an-hour, this slowly protruding mass was fully expelled. On examination, it almost seemed as if the whole of the mucous coat of the organ had been thrown off. At the moment of its expulsion the urine gushed out with great force and in large quantity. The woman from that time obtained instant relief, and continued to improve daily. She was treated with sedatives, and requested to drink large quantities of barley-water and milk and water. At the date when this case was last related (May 10th) the secretion was nearly normal, and the patient was not at all troubled with a desire to micturate.

It may with great certainty be asserted that the mass passed out of the meatus urinarius, because the placenta had been expelled in due time, and this substance, on minute inspection, had nothing of the placental characteristics; it was too large; it was not of the placental configuration; it was not vascular; it had no tufts; there were no signs of funal insertion; on its inner surface there were gritty deposits, evidently consisting of phosphates, the oxalate of lime, and uric acid. Dr. Hall felt something like a foreign body when he introduced the catheter; and then he saw it coming through the meatus. There had been the common symptoms of vesical inflammation; there had been localised pain; a loss of the normal contractile power of the organ; a foetid secretion; and an abundance of ammoniacal, stringy, tenacious mucus. The most remarkable feature in the case was the evident and speedy restoration of the function of the bladder. Having at once fully and entirely got rid of that which had acted like the presence of a foreign body, as it were, the organ without further let or hindrance again took on its natural actions. Nearly all the structural elements of mucous membrane were present. In certain specimens epithelium, musculo-tendinous slips, areolar tissue, and blood-vessels have been described, and most of these instances have been regarded as true exfoliation of the mucous membrane like unto the specimen I have recorded.

Craigie has said that in the chronic form of cystitis the mucous membrane may become thick, firm, and almost cartilaginous with roughness and granular irregularity of its surface, and that not unfrequently it is formed into pouches or cysts by the irregular contraction of the muscular coat. Copland asserts that in chronic cystitis coagulable lymph is sometimes found covering, or attached to, the mucous coat, and that sometimes this may be detached from the muscular parts, or even throughout forming a grayish layer resembling a false membrane. Tanner relates that a few curious cases have been narrated where the whole lining of the bladder has been thrown off in one

piece. In the Royal College of Surgeons there is a remarkable pathological specimen (No. 1993), which well illustrates this uncommon product. It occurred to a man of seventy years of age in Edinburgh, who fell from a scaffold, and had retention of urine and cystitis. Mr. Liston cut into the bladder above the pubes; and the man lived three months after the operation, and died of exhaustion. The layer of membrane, as it is found in the museum, is of saccular form, measuring six inches long and four in diameter. The shape indicates that it lined the whole interior of the bladder, and was thrown off from it in one piece. The outer surface is flocculent, and in parts distinctly fibrous; the inner surface is granular and reticulated, like superficially ulcerated mucous membranes. It exactly resembles the mucous membrane of a bladder separated as a slough in one piece. A case of the kind above related occurred in the practice of Dr. Martyn; it was in a woman, about fourteen days after her confinement. For ten days she had retention of urine, requiring the catheter. Dr. Martyn attributed the exfoliation to the extremely ammoniacal and caustic condition of the urine. The specimen, which was exhibited at the Pathological Society, was on its free surface of a mottled reddish brown colour, with patches of whitish crystalline deposit, and granular. At two or three of the thicker places a rough, fibrous exudation had been produced; more generally the appearances were of fresh, submucous, areolar tissue and muscles of the bladder. The incrustations were of phosphate and carbonate of lime, and certain of the muscular fasciculi had passed into molecular degeneration. Sir Spencer Wells showed one of these specimens at the Obstetrical Society. The patient had been delivered of her first child some weeks before, and, after considerable force had been used by the forceps, cystitis and ammoniacal and foetid urine followed. The mass consisted of the whole of the mucous membrane with some portions of the muscular coat of the bladder. The patient recovered. The urine contained carbonate of ammonia in very large quantity, albumen, and blood-corpuscles. A man, aged thirty-eight, was admitted into St. George's Hospital under the care of Mr. Henry Lee. There had been much difficulty in passing water. A large abscess was opened in each side of the scrotum, under which he sank. On examination the bladder was found sacculated, and in its cavity was discovered a white soft mass, which, on being spread out, was proved to be the greater part of the mucous membrane clearly dissected from the muscular coat of the bladder, and coated with phosphatic deposit. Dr. Buchanan, surgeon to the Royal Infirmary, Glasgow, has given the particulars of an instance in a tall gentleman, sixty years of age. There was a long history of dyspepsia and urinary troubles. He had cystorrhœa with ropy mucus and phosphatic deposit. He went to Wildbad to take a course of the waters and the baths. One day he felt an unusual amount of difficulty in passing urine, and, after a considerable effort, he expelled a white membranous substance, which was bag-shaped and of the size of the

bladder. It was an exfoliation of the mucous membrane expelled entire. He made a perfect recovery. Dr. Phillips, obstetric physician to Guy's Hospital, has published an example. A young woman, aged twenty-one, was delivered of her first child, when considerable extractile force had to be used with the forceps. A month subsequently there was incontinence of urine, the meatus urinarius was so dilated as to admit the tip of the little finger, and she passed from the bladder a membranous substance, the whole of one surface of which was coated with phosphate deposit. It formed a complete coat of the bladder. The patient subsequently did well. Mr. Clement Godson observed an instance at St. Bartholomew's Hospital in a patient under the care of Dr. Greenhalgh. This was in a married woman, twenty-six years of age, who was pale and badly nourished. After having passed the third month of her pregnancy, there came on difficulty in voiding urine. There was dribbling away with much pain and discomfort. For some time the catheter had to be used. At length, a white substance was passed from the urethra. It was a large bag resembling the mucous membrane of the bladder. This patient also recovered. The last case which I shall give is that by Mr. Whitehead, of Manchester. A married woman, in her first pregnancy, had repeated attacks of retention of urine. During her confinement, when the head was passing the brim of the pelvis, a perfect coat of the bladder came out of the urethra.

The greater number of these instances seem to occur during pregnancy; and retention, abnormal secretion, and the use of the catheter have been mentioned. Sometimes the exfoliation is only in shreds or pieces, and these may come away after varying intervals of time. The disturbance conferred to the system is by no means in relative degree to the amount and seriousness of the lesion. Pyæmia and death may follow, but it would appear that such events are only exceptional. Reflected pregnant uterus and pressure on the bladder and retention have in several instances been the facts. Ammoniacal and irritative urine greatly favour the sloughing process. In both sexes mechanical interference in emptying the viscus has, in all the cases I can find recorded, been the case.

XXVIII.

SMALL FATTY GROWTHS OBSTRUCTING THE CYSTIC AND COMMON DUCTS.

GROWTHS of various kinds occur in the parts now described in adults, but such products are uncommon in the young, and more especially in children. The example now given is of much pathological interest. A well-formed female child, three years of age, became an out-patient of the Tunbridge Wells Hospital on the 18th of November. It was reported that about three weeks prior to that date she began to be jaundiced. Mr. Manser, the house-surgeon, visited her, and found the conjunctivæ exceedingly yellow, and the entire surface of a brownish yellow tint. The pulse was natural, and the skin cool. She made no complaint of pain in the head, nor were there any cerebral symptoms. The stools were of light clay colour, and the urine was of deep saffron yellow. She was ordered grey powder and rhubarb on alternate nights; and a mixture with nitro-hydrochloric acid and a bitter infusion. There was no improvement in her condition. The jaundice became more intense, and considerable prostration was experienced. On the 23rd of this month she complained of pain in the right side, which extended into the epigastrium. On the 24th she became comatose, and died on the day following.

An inspection was made forty hours after death. The body was that of a plump, well-developed child. The surface generally was very yellow. On carrying an incision down the mesial line, the white textures were stained of deep yellow. The organs of the thorax were natural. On opening the abdomen the convex surface of the liver was mottled with greenish yellow and dark brown patches. The parenchyma, when freely incised, exhibited considerable congestion, dark fluid gore following the knife. There was no partial enlargement of the organ. The gall-bladder was small and flaccid, and it contained some greyish sero-mucoid secretion, which was very unlike its ordinary contents. Situate at the junction of the cystic and common ducts was a small fatty growth of the size of a large horse-bean. On section it was of yellowish white, homogeneous, non-vascular, and gave a greasy stain to paper. The introduction of the probe showed the cystic and common ducts to be obstructed. The other abdominal organs were healthy.

The above case is one of great rarity, more particularly as being discovered in so young a child. Congenital occlusion of the biliary ducts is sometimes observed, but in such cases the infant is jaundiced from its birth, and death generally ensues in the course of a few weeks. In this instance such had evidently not been the case. Jaundice in children, as in the adult, may supervene from a great variety of causes. When it is seen in children, it is often from inspissated bile, which for a time blocks up the ductus communis, giving rise to colicky pains, and when the place of obstruction becomes free, the yellowness of the skin soon declines. It also eventuates from hepatitis, or when peritoneal inflammation extends from the intestines to the concave surface of the liver, and the tumescence constricts the ducts. Icterus in children is sometimes produced by common diarrhoea. It may be complicated with continued, or one of the eruptive, fevers. I was called in consultation to see a little boy, who had had a very mild case of scarlatina. Jaundice came on as a sequel, and the cholæmic symptoms soon assumed so grave a character as to render the little patient in extreme peril. When, from improper diet, irritation is instituted in the primæ viæ, and the mucous membrane of the duodenum is rendered tumid, such may be a consequence; and doubtless it is in some few instances of mere spasmodic origin. It is occasionally the accompaniment of such chronic affections as general tuberculosis and tabes mesenterica, and of the fatty and amyloid degenerations; and an icteroid discolouration may come on in congenital cardiac disease, when the right side of the heart enlarges and venous obstruction and stasis of the venous radicles render the liver congested, and the biliary ducts are interfered with in their functions; or when the common duct is pressed upon by some tumour, or from some obvious mechanical cause. In the above example the jaundice could be accounted for by none of these causes. The child had not laboured under any dyscrasial disease; the assimilative functions had been normally carried on; it was well nourished and had become well developed. Palpation discovered no glandular disease, nor did the history throw any light upon the cause of this most prominent symptom, jaundice. In fact, the diagnosis could only be ambiguous and uncertain. The absence of bile pigment in the stools, and its abundance in the urine, proved that the secretion did not pass into the duodenum, but was absorbed into the circulation. The apyrexial condition, as evinced by the cool skin, slow pulse, and general supervention of jaundice, rendered it presumptive that some organic cause subsisted.

Again, it was no form of infantile hepatic congestion, because the ordinary remedies did not produce increase of bile in the dejections, and as the case progressed, the yellowness became more intensified. The inspection at once explained the morbid phenomena. It was remarkable that the gall-bladder was so small, and that it was partially empty. In the adult, when this very uncommon condition of permanent organic blocking-up of the cystic duct has been

discovered, the gall-bladder has generally been found greatly distended with serous fluid, and thus the organ has sometimes been seen the size of a large orange, or even of the magnitude of a child's head. In such rare cases a fluctuating tumour has been felt during life. When the obstruction is in the cystic duct *only*, of course, there is no jaundice. By this absolute occlusion of the common duct, the lymphatics and the hepatic radicles would take up more bile than could undergo the metamorphosis requisite for its elimination by the kidneys. In health a very minute quantity of bile circulates in the blood, and when the bile acids, namely, the glycocholic and taurocholic acids, and the pigment are transferred in large and abnormal quantity into the blood, cerebral symptoms invariably ensue; and we know, from experiments made upon the lower animals, that bile, injected into the blood, acts as a powerful poison; and that muscular tremors, convulsions, paralysis, and coma are amongst the more cognisable phenomena elicited by bile-poisoning upon the great nerve-centres. Hence can be well accounted for the comatose condition of this little patient, which ushered in the fatal issue.

XXIX.

CHOREA.

CHOREA, or St. Vitus' dance, is a disease which is not unfrequently seen in practice, nor is it, save in rare and exceptional cases, at all a formidable affection, as a very large number of those attacked would, if placed under no medical treatment, make a full recovery. It runs a definite course, and the symptoms generally become fully developed at the end of two or three weeks after its accession. Children, and those under puberty, are by far the most liable to this peculiar and distinctive ailment. From five to fifteen is the period when it is most prone to come on; some writers have asserted that the time of its most usual advent is from the occurrence of second dentition to puberty, and others have given it as their opinion that both sexes are equally liable to it up to the ninth year. Females have much greater tendency to it than males. It may come on in the adult, and even up to the twentieth or twenty-fifth year. It is often hereditary, and, if full inquiries were made, it would not uncommonly be discovered that some of the family of the patient had some morbid condition incident to the nervous system, such as hysteria, epilepsy, paralysis, or insanity. In those seldom seen cases which end fatally, the disease assumes grave and painful characteristics. The patient is constantly writhing and tossing about in bed, grinding the teeth; the lips are torn and bleed; with the ceaseless turning from one side to the other the elbows, shoulders, hips, sacrum, and other prominent and bony parts have the skin raw and inflamed, and this suffering goes on until death ends the piteous scene. The pathognomonic conditions may be regarded as consisting in the irregular and disordered movements caused by some abnormality in the functions of the voluntary nerves, and the natural powers of volition and muscular action become deranged. An analogy has been drawn between the choreic phenomena and mental aberration, and hence the often used and figurative language in its description of "insanity of the muscles." All the voluntary muscles may in greater or less degree be affected, but it is most frequently observed that those of one side—hemi-chorea—are influenced, and the legs are less susceptible than the arms. The abnormal movements resemble those in clonic spasms. In some cases both legs are affected. In most examples the patient

is calm and still during sleep. In the worst forms even during sleep there are twitchings and jerkings.

It mostly begins with twistings and distortions of the face; the loss of co-ordinative power in the facial muscles gives rise to ridiculous forms of contortion; there may be unopportune winking; various pullings of the mouth, and grimaces as if there were the attempt to be funny; and then the expression suddenly becomes that of vacancy, imbecility, and fatuity. If the attempt be made to put out the tongue, it is often rolled about in the mouth, thrust into one or other cheek, and after an apparent effort it is quickly protruded and then withdrawn, it may be with a sharp snap of the jaws. The eyes may be only partially closed, or one may be quite shut. The head may be moved in semi-rotatory, bowing, or nodding way. The hand is sometimes turned palm-upwards, and there is uncontrollable action of the fingers. Anything attempted to be carried is often momentarily dropped; the arm falls to the side, and as if with an effort raised again; there may be numbness, and an unsteady gait, dragging of one or both legs in walking, and when the patient is seated the feet are often scraped on the floor. A want of calm and repose is noticed in all instances of the disease. An unmeaning fidgetiness obtains, and very often there is a stammering, hesitating way of speaking; the voice may be thick, words being badly pronounced, or the power of articulation may be absolutely lost.

The *predisposing* causes are those which usually proclaim a lowered and an enfeebled state of health, as seen in other forms of disease of the nervous system. There is often anæmia; the digestive organs are disordered; the appetite is bad, and hence impaired nutrition. The bowels are mostly costive; the accumulation of fæces gives rise to irritation, and a tumid state of the abdomen is common. Sometimes an antecedent and acute disease, by producing general debility, may have preceded the more developed conditions of the complaint. Again, a bad and an insufficient diet, an impure and close atmosphere, and a cold and damp climate have been mentioned under this head. Crowded localities and residence in large towns and cities have also been instanced. Sometimes it is preceded by decayed teeth, the irritation of worms, and imperfect and difficult menstruation. The patient may have had epileptic seizures, or some kind of convulsive affection denoting error of function in certain of the great nerve-centres. There is mostly a want of muscular power; fatigue is easily produced, and it is long before the feeling of being tired or of exhaustion passes off. The voluntary muscles having become soft and flabby, any little extra exertion is followed by weariness, and often a state of lassitude is noticed. There is always apathy and some degree of mental deficiency.

In briefly mentioning some of the most usually *exciting* causes, it should be held in mind that certain morbid conditions have

generally been present, which are favourable to the development of the disease. Some acute affection, as rheumatic fever, or one or other of the exanthems, may have been passed through, and left increased debility. Sometimes a fall, blows on the head or spinal column, a fright, or sudden mental excitation may have immediately preceded. Suppressed cutaneous eruptions, a chill during perspiration, some hidden dread, nurtured fear, or improperly indulged imaginations may be sufficient for its induction. It will, also, come on by a sort of imitative tendency, or in a contagious manner, as it were, through association with another individual labouring under the malady. And occasionally the acuter symptoms arise when the proximate or exciting influence cannot be recognized.

A number of, and many diverse and varied, theories have from time to time been given as to those *pathological* changes which have been said to give rise to the disorder, many of which seem vague, indefinite, and ill-defined now that morbid and microscopical anatomy is pursued with such assiduity, precision, and success. There is doubtless primary irritation of the organic or ganglial nerves, which is extended to those of volition, hence the mobility and abnormal action to those muscles which are under power of the will. There may be cognizable evidence of foregoing inflammatory action of some part of the cerebro-spinal axis, as evinced by inspection. It is now generally admitted that between rheumatism and chorea there is an intimate relation; the first-named being essentially a blood-disease; and unhealthy blood circulating through various organs is the common cause of articular, cardiac, and spinal symptoms; hence it can be understood how the nerves of volition subsequently become abnormal in their functions. Chorea does not occur during the acute and fever state of rheumatism, as it is broadly characterized as a non-febrile affection. It follows much more commonly when there has preceded endocarditis, than when there has been pericarditis. In a large number of the cases of the disease now described, it would be found on investigation that certain members of the patient's family had previously been affected with some form of rheumatism. Dr. Dickson has shown that morbid anatomy reveals a widespread and symmetrical hyperæmia in the nerve-centres, especially at the ganglia, the base of the brain, and spinal cord; and notably so at its upper part, and the posterior and lateral portions of its grey matter. Hæmorrhages, exudations, and degenerations of those arterial branches which supply the nerve-centres have often been seen. Other and recent writers regard this malady as being produced by minute emboli, freed from the cardiac valves, and carried by the circulation into the small vessels of the convolutions and other parts of the brain, particularly to the corpora striata, and the optic thalami. Other observers have believed these thrombi to be an accumulation of white corpuscles, which plug up the small vessels, impair nutrition, and thus loss of nerve-power and

error of action in the voluntary muscles. In a large proportion of choreic examples, auscultation discovers cardiac murmurs, and foregoing inflammation of the cavities of the heart, as the complication of acute rheumatism, having left exudative deposits, more or less of valvular incompetency results. Several authorities in much detail, and with statistical accuracy, have commented upon this fact. The membranes of the spinal cord and the cerebellum have been found evincing the proofs of foregoing inflammation. When the disease begins in the cord or its coverings, the pain is generally localized in some part of the back, and when the cephalic organs are first morbidly influenced, the symptoms exhibit more of the convulsive character. Inflammation, as it has correctly been insisted upon, is not nearly always the precedent of chorea, and it may rather be said that those irritative conditions, which are followed by the inflammatory phenomena, and that affect the nerve-centres and the incident nerves, fundamentally give rise to it. Inflammation and fever are not necessary to its causation, but rather to those blood and systemic changes which are so often succeeded by convulsions, spasms, and paralysis. In some examples it has been noticed, when during the presence of the affection inflammation or some form of fever has come on, there has been a suspension for a time of the choreic symptoms, and that they have re-appeared when the acuter states of the before-named diseases had passed off. In certain instances of chorea, when an examination was made after death, no traces of inflammation could be discovered; hence the ill-defined term of irritation could only be assigned as productive of the fatal issue. Amenorrhœa, uterine disorder, and excitation of the generative organs, sometimes are the sources of these strange and reflex movements; and thus, when the catamenia become regular, and after puberty, the complaint less frequently comes on; again, the improved powers of digestion, better assimilation, and a normal condition of the blood, are opposed to its development. It is one of those numerous effects associated with a general and lowered vitality, and the want of natural strength and tone in the entire organism.

The *symptoms* can hardly be mistaken, as the motional peculiarities are so markedly distinct and characteristic, that those who have only seen few examples can hardly fail in its recognition. The jerking of the muscles in varied parts; the unmeaning and repeated motions of the head, neck, shoulders, and trunk; the general want of calm and repose which there is; the fidgety, restless shutting and opening or eversion of one or both hands; the twisting of the fingers; the absurd smiles, frowns, and, as it would seem, put-on expressions, from loss of co-ordination of the facial muscles, exhibit the real nature of the malady not to be forgotten. The loss of normal motive power so usual in one side; the jumping, starting, staggering, often palsied-like walk; and that want of balance and steadiness, as in health, and with the feebleness

or dragging of one or both legs, are states which at once confer interpretation as to the cause. Again, the complaining of aching limbs; frontal uneasiness, or more absolute pain; the altered voice; the stammering, stuttering efforts to speak; the pallor of the countenance; unhealthiness of aspect, and the vague, meaningless, ill-performed, and repeated muscular actions, are the usual states with those thus afflicted. On auscultation there would be discovered, in a large majority of cases examined, some form of abnormal cardiac sounds, left by foregoing endocarditis. From the deterioration of the blood, and a diminution of its fibrine and red globules, these altered sounds may be only functional, and in the course of time, and with the disappearance of the choreic state, pass off. It may be here added, the general appearance of the patient is often such as to give the idea of there being mental incapacity. In those seldom seen instances when death eventuates, the symptoms become intensified to an extreme and distressing degree. The patient moans and tosses about in bed from one side to another, the spasmodic muscular contractions are violent, and at length return with scarcely any intermission; the power of deglutition often ceases, and general exhaustion, the loss of sleep, and, finally, delirium and coma follow in the train of sequences and close the sad scene.

There can hardly be any difficulty in *diagnosis*, as the affection from its beginning is so singularly distinct in the appearances which it exemplifies. Epileptoid seizures may for a short time resemble it, but they pass off, and there is not that constantly recurring repetition of uncontrollable muscular movements. In hysteria, age, sex, clinical history, and the kind of attacks sufficiently prove their non-identity. It has been said that loco-motor-ataxy likens chorea; but loco-motor-ataxy by far most frequently comes on in males of middle or more advanced life; it is generally in the legs only; the sensorial functions are implicated; some defect of vision is usual; and the bladder and rectum lose their contractile power. And the *prognosis* from what has already been said is most favourable, as in nearly all instances of choreic patients recovery eventuates.

On reference to the records of *twelve* cases of chorea which came under my observation, *nine* were in girls, *two* in boys, and *one* in a married woman, twenty-two years of age. *Five* were very pale, and *six* were very thin. *Four* articulated with great difficulty, and *three* for a time could not speak at all. *One* began with an epileptic fit. *Three* were greatly affected in the left side, and *three* in the right. In *one* both legs lost their power, and he could not walk. In *one* the cause was referred to a fall; in another to having been beaten on the head and back. *One* it was said took on the disease by seeing and associating with another boy who had the malady. In *three* the jactitations were extremely pronounced, and in one they came on during sleep.

As to *treatment* in *two*, who had the clonic movements in violent

degree, nauseating doses of antimony were given with markedly good effect. Calomel in conjunction with some ordinary aperient was prescribed in all. In some instances opium was needed. Each had either zinc or iron with some bitter infusion; and a carefully selected and nourishing diet, with a moderate allowance of wine, without exception was ordered. Cold sponging or the shower-bath was in no instance omitted. The average age of eleven was *ten* years. And in *ten* the average time under treatment was seven weeks and six days. Each made a full recovery.

XXX.

TUBERCULAR MENINGITIS.

MILIARY tubercles in the membranes of the brain give rise to that disease known as the acute affection tubercular meningitis. Local irritation being instituted by these depositions, the cerebral substance, to greater or less extent, assumes the inflammatory condition, when grave symptoms, covertly, or in more rapid manner, supervene. The morbid changes thus locally set up are in nearly all instances but one form of the tubercular diathesis, and generally hereditary. It prevails most in certain families, and, upon inquiries being made, it can often be discovered that some of the same kindred have had the malady. It comes on much more frequently before than after puberty. The period most prone to its supervention is from two to four years of age; it may, however, appear in infants, and it may with confidence be asserted that about eighty per cent. occur before the tenth year. It is sometimes noticed in adults and up to thirty; it is then, however, almost always in association with mesenteric disease or pulmonary phthisis. In exceptional cases it is witnessed in middle life, and in a few rare examples in declining and advanced age, but then only as a fragment, as it were, of the great and foregoing general morbid change tuberculosis, as proclaimed in other organs and tissues. Sex, temperament, vocation, seasons, and injuries to the brain substance, seem to have no influence in its production.

SYMPTOMS.—The symptoms are generally such as precede and become observable in other forms of tuberculosis. In some few cases they may come on during a condition before regarded as good health. As the rule, there are foregoing indications of some alteration in the system. Paleness of the face, and a general loss of flesh are the most common signs of its advent. They may be masked or more suddenly developed. In the child there are often fretfulness and irritability of temper; it may be that it is obstinate and petulant, and deport itself in a way very different from its wont. It will cease to take the same interest in its play and amusements as it had done. It will throw itself on the floor and sleep for a time, and then wake up suddenly and perhaps crying. During the night it is often restless, changes the position of its head on the pillow, grinds its teeth, and may lie with its eyelids

only partially closed, and often wakes up in starting manner, and with a scream, as if in great pain. If old enough it will place its hand on its forehead, and complain that something there hurts it. It cannot bear noises, and will avoid the light. The appetite is bad, and loss of strength is mostly apparent.

The *invasion*.—Vomiting is by far the most commonly observed irritating condition when the acute state is being ushered in. Nearly all writers put emphasis upon this fact. Sometimes the attacks of sickness are for a time almost incessant, and, too, when for a while no food has been taken. Flushing and pallor of the countenance are often in marked degree. Feverishness comes on, the skin is usually hot and dry, the temperature is increased, the abdomen contracts, and constipation often obtains. Restlessness, low-muttering delirium, hurried respiration, and quick pulse are the usual characteristics. With the progress of the disease there may be staggering in the gait; rigidity or loss of power in one limb or in one side; inequality in the contraction of the pupils, or one or both may be dilated; strabismus and rolling of the eye-balls are also not unusual. When the basic nerves become implicated, insomnia, tinnitus aurium, deafness, twitchings of the facial muscles, or paralysis of one side or some part of the face; one or both eyes being partially closed; subsultus tendinum, and convulsions are the not uncommon accompaniments. Towards the close there are often drowsiness, decrease of ability to move the position and limbs, the attacks of vomiting are less frequent and distressing, or may have ceased; diarrhœa often sets in; the feverishness diminishes, the temperature falls, the pulse becomes of less volume and more frequent; sighing and long drawn respirations, cold sweats, and increasing coma come on. Inability to swallow, retention of urine, or the loss of power in the bladder and bowels may allow the excretions to be voided involuntarily; and coldness of the legs and feet are often noticed towards the close. The disease, dating from the coming on of the acute symptoms, may be from seven to twenty-three days before the fatal ending. In exceptional instances the patient may live twenty-five or thirty days, or even longer.

The three cases now given are good illustrations of this affection as it is ordinarily met with in practice.

CASE I.—A little girl, with light hair, fair complexion, large blue eyes, and seven years of age, began to be ill on the 27th of June. She then complained much of pains in the head, afterwards had nausea and occasional attacks of vomiting. These symptoms increased in intensity, and the house-surgeon, by whom she was attended as an out-patient, was on the day named first requested to see her. The head affection became more marked; at intervals she screamed, and rapidly turned her head on the pillow as if in great suffering; she ground her teeth, and after having for a time been asleep she would wake up in a startling and an agitated manner. I saw her with the house-surgeon on the 8th of July,

and she then lay prostrate and in an unconscious state. The pulse was quiet and but little above the normal frequency; the skin and head were hot, and the pupils were largely dilated and quite immobile. She moaned and rolled her head from one side to another, and took no notice of anything passing around her. She had been well purged, the hair had been cut short; cold had been sedulously applied to the head; and she had been taking a mixture with the iodide of potassium. All the symptoms having assumed so grave a character the head was now ordered to be shaved, and ice applied. Port wine and strong beef-tea were given at short intervals. She died on the 12th of this month, after having been fifteen days under medical attendance.

Forty hours after death an examination was made on the body. On removing the calvaria, the membranes and encephalic mass were discovered to be greatly injected. On the vertex they were agglutinated by a sticky exudation. From two to three ounces of serum escaped from the ventricles. In the longitudinal and sylvian fissures an abundance of small whitish, elevated tubercular deposits were discovered. The encephalic mass at the base was generally soft, and in some parts the cerebral structure had become semi-diffuent.

CASE II.—A little boy, three years of age, was brought into the Hospital the 15th of June. His sleep during the night was much disturbed by pains in the head, and he was evidently very unwell, as seen by his general appearance. After having been in the institution three weeks, serious symptoms, somewhat *suddenly*, supervened. The bowels then became irregular, and he had attacks of sickness and vomiting. The pains in the head became worse; he ground his teeth when asleep; tossed his head from side to side on the pillow; and would suddenly awake with screaming. For a fortnight after the advent of the above recorded unwelcome change in the morbid phenomena, he continued much the same. Then an alarming condition, in rapid manner, succeeded. He had paralysis of the left arm and leg, and he became pale in the face and was comatose. On examination the pupils were dilated, the pulse was exceedingly quick and very feeble, and the respiration was greatly increased in frequency. He died on the 23rd of July, sixteen days after the speedy coming-on of the more acute and alarming conditions.

A post-mortem examination was obtained. The body was not greatly emaciated. The head was large, and the fontanelles were fully closed. On removing the calvaria, the encephalic mass, generally, was redder than natural and greatly injected. On taking out the brain, four ounces of clear straw-coloured serum flowed out, and the membranes, especially the pia mater, were much ramified and injected. On examining the longitudinal sinus, at the edges of the hemispheres, small, yellowish, bead-like tubercular eminences were in great number seen, more especially along the inner edge of the left hemisphere. The same bodies were very numerous

found in the right fissure of sylvius. The arachnoid and pia mater at these places were opaque, thicker than natural, and vascular. The lateral ventricles were dilated, and each contained several drams of serum.

CASE III.—A maid-servant, sixteen years of age, was admitted into the Hospital on the 29th of July. It was reported that one sister was delicate, and so far as could be ascertained the symptoms of her indisposition were those of a phthisical character. This patient had always been a healthy girl until four weeks prior to her admission into the hospital, when one morning she suddenly lost power in her left arm. As she expressed herself, she “felt a catch in it.” Her left leg, also, became weaker than the right. The catamenia had been irregular for four months before she came into the institution. She went home, and was under the medical treatment of a local practitioner for a couple of weeks; and for a fortnight was an out-patient. During this time she suffered from frontal headache and loss of power in the left side. She had night sweats in considerable degree. On being admitted her right pupil was seen to be preternaturally dilated and almost insensible to light. Her mouth was slightly drawn to the right side. Crepitation with prolonged expiration and slightly increased vocal resonance was heard at the left apex, just below the clavicle, but there was no appreciable dulness. During several days there were no particular features in the illness to be recorded. The pulse ranged over 100, and the temperature reached 102.

August 9th.—In all respects worse. The right pupil was still dilated, and the mouth drawn to the right. On protruding the tongue it inclined to the left. There was slight deafness. She answered questions rationally when spoken to in a loud voice, but often required a repetition of the question before she answered, as if the memory were not good. The bladder and rectum were emptied unconsciously. The head was not remarkably hot, but she had now become very drowsy and slept a good deal. The tongue was cleaner; the pulse 100, and the temperature 103.

On the following day all the symptoms were more emphasised. It was reported that she had lain in a state of stupor all night. She was now duller and more apathetic; she would not answer questions when spoken to, and when told to put out her tongue, could evidently with difficulty only protrude the tip, just beyond the teeth. She could take food, and the power of deglutination seemed in no degree lessened. There was slight cough occasionally. The helplessness of her condition was more pronounced, and the urine and fæces passed without effort and without her knowledge. The circulation and temperature were both altered.

August 11th.—She was more rational and answered questions fairly well, but was very deaf. There was convergent strabismus. She had no pain, but there was no amendment in the paralysis.

Four days after the last report there was complete ptosis of the

right eyelid; low-muttering delirium had set in, and she constantly tried to get out of bed. The bowels had become confined and were opened by croton oil. It was quite evident that she was then rapidly approaching the end. She lay quietly; picked the bed-clothes; the conjunctivæ were covered by a sticky mucus, and the power of swallowing had become very difficult. The prostration and the graver symptoms gradually became more and more pronounced, and she died, having been twenty days in the hospital. The treatment had mainly been mercurials and other purgatives, with diffusible stimulants; and cold had been assiduously applied to the head. Light and digestible nutrients were given at short intervals.

On an *inspection* being made, the body was that of a well-formed young woman, and showed little evidence of disease, there being no emaciation. On taking off the calvaria, and exposing the encephalic mass, the whole looked redder and more vascular than normal. Tubercular deposits with lymphic exudation were copious, more especially over the vertex of the right hemisphere. The pia mater at this part was opaque and studded with small granular bodies. These tubercular formations were very abundant, and accompanied by depositions of lymph at the base of the brain, and through the fissure of sylvius. A considerable quantity of serous fluid flowed from the cavity of the arachnoid. On various sections being made of the cerebral substance, nothing notable was discovered. On opening the thorax, and removing the lungs, a cavity full of pus and of the size of a walnut was revealed deeply formed at the inner side of the left apex. It was surrounded by an infiltrated deposit of tubercle. There were, also, some small collections of the size of peas, of caseous matter, which were becoming soft, near the root of the left lung. There was also tubercular infiltration of the right apex.

The two cases first recorded, those of the little girl and the little boy, were very typical of the disease. The prodromata in both had not been in marked manner. She was of nervous and excitable temperament, and, as usual, pains in the head, vomiting, restlessness, grinding of the teeth during sleep, then suddenly waking with a scream, and continually moving the head on the pillow, were the characteristic indications of this form of brain disease; and these remarks were also applicable in the illness of the boy. In neither had the predisposing conditions been long or prominent. From the kind of phenomena presented during life it was presumptive that the cerebral convexity in both was with other parts the seat of lesion, and the hemiplegia which came on in the boy showed the grave changes existent in the head. In the instance of the young woman, it is seen that acute hydrocephalus is by no means limited to children, and that it may occur to those advancing towards adult age. In her the hemiplegic symptoms were amongst the earliest indications of brain disorganization. Not unfrequently patients with this disease, when grown up, have numbness, rigidity of a limb or

of both arm and leg, and more or less of delirium, or some motorial signs. When pulmonary or mesenteric indications are detected, the diagnosis is rendered more certain.

MORBID ANATOMY.—Generally there is little difficulty in the separation of the calvaria, and on its removal the membranes and encephalic mass look red and injected. The tubercular deposits are then brought to view on the vertex of both hemispheres. These bodies vary greatly in size; they may be the size of a millet-seed, a pea, and in some rare instances the morbid product has been as large as a hen's egg. They are often white externally, and, when more carefully examined, are yellowish in the centre or entirely yellow, friable, and of cheese-like appearance. The longitudinal sinus may contain fluid blood, loosely formed coagula or a dark thrombus. When these adventitious products are so large that they can be clearly examined they present a homogeneous substance, destitute of vascular permeations, and are enveloped in a thin and clear or an opaque cyst, which is adherent to the surrounding cerebral tissue; and in certain instances, more especially in the adult, and when the disease has been of long standing, the covering may have become fibrous, cartilaginous, or even ossific. These eminences may not only be abundantly scattered on the brain surface, on the walls of the ventricles, the anfractuositities, the sylvian fissures, and at the base of the cerebrum, but on sections being made they may be detected in the brain substance, more especially in the grey formation. The pia mater being injected and hyperæmic, as it was in these examples, looks red and inflamed, and it is often notably thickened. In the inspections recorded, inflammation and the common changes by which it is followed in serous membranes in marked manner were presented. The arachnoid is usually sticky, its cavity is often destitute of fluid, and sometimes patches of lymphic or purulent character are interposed between its surface and the pia mater, and such may be so extensive as to resemble interposed coverings to the vertex of one or both hemispheres. They thus constitute the same kind of results as those which succeed acute mesenteric disease, or when there has been inflammation in the serous membrane of the thoracic cavities. Some pathologists have given it as their opinion that the tubercular deposit is always at the first merely a fluid exudate, and that eventually, when the process of absorption has for some time been carried on, this albuminous residuum becomes more or less solidified, and then puts on a figurative or formative appearance. The effusion of serum in varying amounts is the ever constant accompaniment. The lateral ventricles may contain several ounces of straw-coloured or paler clear serosity, as were discovered in the little boy. When the quantity is large, the substance of the cerebrum becomes pressed upon from within; the vascular circulation becomes impeded, the capillaries may be greatly obstructed or obliterated, the centra ovalia be rendered pale, the cerebral tissue be softened and

atrophied, and the convolutions, by being compressed against the skull, be flattened and in greater or less degree rendered bloodless. In the little girl, as stated, the encephalic mass at the base had become soft and semi-diffuent. Occasionally a considerable part of the cortex may have become softened. There is often agglutination of opposed surfaces, and many of the morbid changes have their analogue in those *post-mortem* conditions which are revealed in the autopsies made in pulmonary phthisis. There is no just and proportional correlation between the amount of tubercular deposit and the degree or acuteness of the inflammatory phenomena, as sometimes meningitic symptoms may have been much pronounced and severe when few of these bodies have been present ; and, on the contrary, they may have been most numerously disseminated, not only on the membranous coverings, but have been found in the cerebral structure when the morbid phenomena have not been marked or intensified.

Unlike, as in the great majority of other diseases, little can be said as to the *prognosis* and *treatment* of tubercular meningitis. In the acute forms of the affection a fatal ending is almost invariably, if it be not said always, the result ; and the remedial measures are mainly intended to mitigate suffering, and are had recourse to with little, if any, hope of producing any other benefit.

MYELOID SARCOMA TUMOUR OF THE BRAIN.

CEREBRAL tumours are now known as being of distinct and various kinds; indeed, the brain is subject to the same morbid growths as those which are common to other organs and tissues. Paget was the first to employ the word myeloid, because he discovered the corpuscular elements of this growth to resemble those found in the marrow of young bones. But more recent observers do not believe that giant-cells are characteristic of the tumours now described, as they are found in almost every kind of tumour, and eminently so in the carcinomatous formations. These tumours are apt to occur in the young, and in those of middle life. Some years ago, a tall, strong-looking man, aged thirty-one, a bricklayer, presented himself as an out-patient at the Tunbridge Wells Hospital. He was then affected with seizure of an epileptoid character. It was reported that, when six years of age, a heavy door fell upon his head edgewise, the blow being at the vertex, a little to the right of the mesial line. The scalp over a large space was detached, and he was instantly rendered insensible. For six weeks he then lay in an unconscious state, but at length recovered. Throughout the years of his boyhood, he had been exceedingly irritable and irascible; and this peculiarity his parents attributed to the injury sustained on his head. He had often complained of headaches and more absolute pain in the head; and when he became a man, these pains were caused by trifling causes of excitement, and were often severe. He was of temperate habits, and even small quantities of stimulants excited him. He married, and pursued his occupation for several years without any marked inconvenience from the head symptoms before described. He had never had any illness since the accident.

In the month of September, when twenty-eight years of age, and twenty-two years after the injury above described, he fell down suddenly from a strongly marked fit of epilepsy. Seizures of the same kind came on once in three or four weeks for a twelvemonth. During the following year he was much more free from the fits, but a partial loss of memory and a feeling of general debility rendered him unequal to the resumption of his employment. When under my care he was treated with the bromide of potassium in large doses for a considerable period. For a time this medicine seemed to

produce benefit, but the relief became less. Other remedies were tried, but only with temporary advantage. He presented himself at the hospital at varying intervals for between two and three years, and his features and appearance had assumed those peculiar characteristics which mark the general aspect of confirmed epileptics.

Two and a-half years afterwards he had the last epileptic fit; and I may here observe that since the first attack, he sometimes with much suddenness lost motor-power in the left arm and leg. This loss of action would continue for two or three hours, when the voluntary muscles gradually regained their functions. He never had any anæsthesia or any facial paralysis. The pains in the head had always been referred to the place where he had received the blow.

Three years after, one evening, he began to be dull and sleepy, and these symptoms were soon followed by an attack of vomiting. On being roused he complained of pains in the neck and back. He then lapsed into unconsciousness, and died on the following morning at seven o'clock.

On examination of the head, sixty hours after death, there was no morbid cohesion of the scalp. On attempting to remove the calvaria the dura mater was strongly attached to the upper part of the right parietal bone, and at the place of attachment a small osseous mammilated projection, the size of a horse-bean, was discovered. The brother, who was present at the autopsy, said this was the precise spot where the blow had been received. The dura mater, arachnoid, and pia mater were there firmly united, and, over a considerable space, thick and opaque. On the removal of the encephalic mass, a tumour, of the size of a small Chinese orange, was found in the right hemisphere, and under the osseous, tuberculated nodule. The convoluted substance had been thinned, and at one part abolished. The surrounding cerebral tissues were of soft consistence. On a section being made of the tumour, it exhibited a firm, uniform, smooth, succulent, shining surface, and was of a yellowish white colour. It did not break down under the fingers like medullary cancer, but had a more resisting fibrous texture. It was enveloped in a delicate semi-transparent membrane. Under the microscope were seen oval, lanceolate, or elongated caudate cells, nucleolated cells, free nuclei, and shining molecular fatty matter; also, some minute vessels of an orange tint, which had evidently undergone fatty decay.

The characteristics of this growth, as above remarked, very closely resembled the description given of myeloid tumour by Sir James Paget. He and subsequent observers assert that these fibro-plastic or myeloid formations sometimes are of very slow development; and it is exceedingly probable that such was the fact in this instance. The giant-cells before spoken of, which, as it were, suggest a return to the foetal type, are found in myxoma and in lymphoma, and, too, in tubercular products. From the history of this case, and from the facts that this man's disposition became altered by the accident; that

he always afterwards complained of pain at this spot ; that lesions of the membranes directly beneath the seat of injury were discovered ; and that the tumour occupied the portion of the right hemisphere, in immediate apposition to the place where so much organic disease had, at a remote date, been set up,—it would seem but a rational inference that the morbid growth was primarily attributable to the blow.

XXXII.

SYPHILITIC TUMOUR AT THE BASE OF THE BRAIN.

A SHORT, somewhat thick-set man, thirty-eight years of age, was admitted into the Tunbridge Wells Hospital on the 5th of March, suffering from severe pain in the back of the head and neck. Twelve years before the patient had syphilis, but had been a fairly healthy man; he was married, and had several healthy children. Two years and a half before he fell downstairs, pitching on his shoulder and the side of his head; but he was not stunned, and sustained no scalp-wound.

His illness began two years previously with pain at the back of the head and neck. He felt weak, and had restless nights. These symptoms became worse, and, six months later, he complained of his tongue feeling "too large for his mouth," and was unable to protrude it as far as formerly. He also spoke, as his friends expressed it, as if "his mouth were full of plums."

The secretion of saliva was also greatly increased, necessitating frequent spitting. Nine months prior he began to suffer from diplopia, due to paralysis of the left external rectus muscle of the eyeball. As he got no better, he was admitted into the institution. On admission, he was seen to be an emaciated man, looking older than his years warranted. He complained of a severe pain situated at the back of the head and radiating down the back of the neck to both shoulder-blades. The pain was seldom absent, but was aggravated at night, and greatly increased by the recumbent posture.

There was complete paralysis of the left external rectus muscle of eyeball, and slight ptosis of the same eyelid. The velum pendulum palati was paralysed and drooped on the left side, and the uvula was deflected to the right. The tongue was exceedingly soft and flabby, and the patient could not protrude it beyond the teeth. The mouth was full of a viscid saliva. He was unable to turn his head without moving his body at the same time; nor could he raise his right arm above his head. A tumour, some deposit, or thickening at the base of the brain was diagnosed, and, as it was suspected to be of a syphilitic character, iodide of potassium was administered in fifteen-grain doses, without, however, any beneficial effect. Sedatives were also given to allay pain.

The patient remained in the infirmary about one month, and then, as he was no better, went home to his family. While there, the pain became more intense and unbearable, and the patient's tendency was suicidal. He suffered from cough and dyspnoea during this time. Five days after leaving the hospital, he suddenly complained of a suffocating sensation in his chest, and asked his wife for a mustard poultice. She went out of the room to get it, and, when she returned, he was dead.

Post-Mortem Examination.—On opening the head, the walls of the skull were found to be enormously thickened, nearly half an inch in thickness. The dura mater was very adherent. There was a quantity of serous fluid in the cavity of the arachnoid and ventricles of the brain. The brain-substance was healthy. On its removal, there was seen to be a tumour of the shape of a horse-chestnut, and double that size, situated beneath the dura mater, on the anterior and left lateral margins of the foramen magnum, projecting upwards into the cavity of the skull, and extending down the vertebral canal. By its pressure, the upper part of the spinal cord and medulla oblongata were flattened and pushed to one side. On cutting into it, the contents were found to be grey curdy pus, with several sequestra lying loose in the cavity of the abscess. The largest of these sequestra measured one inch long and half an inch broad. The bone round the cavity of the abscess was soft and carious. Neither the cavity of the thorax nor the abdomen was examined.

Intra-cranial syphilitic affections are very rarely seen in the form of diffuse meningitis. They are, as the rule, observed as local lesions of the membranes, and most frequently the dura mater is diseased at the convexity of the hemispheres, and at the anterior and under surfaces of the brain. The external aspect of the dura mater presents the specific deposits, and the bones of the skull of the corresponding parts become thickened, occasionally to a great extent; and this thickening sometimes exerts a grave influence upon the cerebral substance, more especially when it happens to be at the base, and when the nerves and medulla oblongata are encroached upon as in the above case. The central parts of the brain are far less liable to be the seats of morbid change. The membranes at the first are rendered vascular, and they then become matted together by a yellowish material which at its outer and ill-defined borders takes on a greyish white colour. The under aspect of the pia mater adheres to the cortical substance, and in the more chronic and tertiary cases these depositions, variously termed sypholoma or gummata, are formed. Usually there is one gumma, and this of very varying dimensions. Not unfrequently there are several gummata. They are of irregular conformation. They are somewhat resistive to the finger, and on section they are of pinkish red or of light fleshy colour, and sometimes they are of yellowish grey and translucent, cheesy or gluey in appearance. They are

not figurative and defined like sarcomatous tumours, nor have they the central softening like tubercle. They involve contiguous parts, and primarily cause induration of the brain-tissue. The situations where they attain the greatest size are from the optic commissure anteriorly to the pons behind, and towards the cerebellar peduncles. They may in exceptional instances even be of the bulk of a hen's egg. These deposits are often found at the fissure of Sylvius, when the middle cerebral artery is liable to become involved. Other cerebral tumours and abscesses are mainly discovered in the surplusage of the brain. Sir William Gull told me that he had many years ago pointed out the peculiarity of abscess electing the surplusage of the cerebral mass, and that his experience up to this time had confirmed the correctness of this observation, and he recounted to me some lately seen and illustrative instances of this pathological fact. Doubtless the cord and its membranes may be in similar manner the seats of lesion, but few examples are recorded. These neoplastic formations surround, press upon, and disorganize the cerebral arteries, and they become obstructed by thrombi; the walls of the arterial vessels are rendered thick and inelastic, and as the result of hyperplastic transmutation rupture, sanguineous extravasation, and death in the train of sequence eventuate. The vascular parts of the brain are most liable to syphilitic depositions. These growths under the microscope exhibit small cells and a fibrous stroma, and the fibres generally run parallel with one another. Towards the centre larger and fusiform cells have been noticed.

The various forms of convulsive affections are, as the rule, the primary symptoms of this disease. Vascular obstruction, by impairing the nutrition of certain portions of the cerebral mass, gives rise to the anomalous discharge of nerve force, just as epileptic seizures come on in advanced life. The cortical substance is generally implicated, and both the hemispheres are often the seats of lesion. The age and the syphilitic history would be important guides in diagnosis. There may be frequent attacks of *petit mal*, the condition of gradually increasing mental enfeeblement; or even absolute mania may supervene. Headaches, giddiness, faintness, loss of speech and dimness of vision, are frequently present. Not uncommonly facial paralysis, or hemiplegia of one or both limbs, is the antecedent of the fatal issue.

XXXIII.

SYPHILITIC HEMIPLEGIA.

A STOUT, fresh-coloured young man, by occupation a carpenter, and twenty years of age, was admitted into the hospital April 5th. His general health had usually been exceedingly good, and he had never had any severe disease. After many and careful inquiries it was evident that about nine months previously he had had syphilis, which under treatment in the course of time disappeared. Five days before he came into the hospital he first felt some numbness in the right nates, "as if the part were asleep." On the following morning, on getting out of bed and trying to make water, to his astonishment he was unable, and though he tried several times during the forenoon, he could not still empty the bladder. He continued at his work until midday. His legs then, in his own words, seemed "to roll under him." In the afternoon a surgeon was sent for who drew off the water. Next morning (April 2nd) he found on waking that he could not move his left leg, and that the entire limb felt numb. The right leg was not in the least affected. There had been, he said, no convulsion, no loss of consciousness, no drawing-up of the angle of the mouth, no ptosis or other facial indication of paralysis. Such, however, was only his own account. The symptoms came on gradually. The arm was not in any degree affected. The retention of urine continued. When he came into the institution he had not the least motor-power in the leg, and he had to be carried from the vehicle to his bed. The sensifc function though diminished was not abolished. Titillation of the sole of the foot did not produce reflex phenomena. He could distinguish whether one or both points of a compass were applied. There were convulsive twitchings of the limb when he was passing into sleep. On percussion of the spinal processes there was slight tenderness over the first and second lumbar vertebræ. Tongue clean, appetite good, bowels open, pulse 76 and natural. Urine presented no morbid products. The physical signs of thorax normal. He was cupped to four ounces over the lower back, and ordered five-grain doses of the iodide of potassium in a bitter infusion three times a day. At the end of a week he was decidedly better and could slightly move the leg, and the sense of feeling was more restored. The bladder was still unable

to expel its contents. A small blister was placed on either side of the lumbar spine.

April 20th.—Much better. More power in leg, and could expel the urine. In the course of a week from the last date he could bear some weight on the affected leg. To be electro-galvanised every morning.

May 19th.—Greatly improved. Iodide of potassium continued. His progress was now steady and uninterrupted. In the first days of June he could walk up and down the ward with comparatively little lameness, and on the fourteenth of that month he walked with only a slight limp. He subsequently had full restoration of both motor and sensific functions; in fact, made a perfect recovery.

The next example is one of considerable interest. A young man, twenty-eight years of age, a smith, was admitted into the hospital. He was a muscular, well-built man, and it was reported that up to the time of this illness he had enjoyed good health. When admitted, he had right side hemiplegia, had to be carried to his bed, and it was at once discovered that his case was one of aphasia and agraphia. When interrogated his only reply was "ha!" which inarticulate sound was often accompanied by a nod. He could not in the least intelligible manner pronounce the words "bad," "good," "home," or any other monosyllable. On being asked to write with his left hand on the slate he was quite unable to do more than make some incongruous and confused characters. It was ascertained that he had never had rheumatic fever, nor any other grave disease. Ten days prior to his admission, he felt generally unwell; the left arm and leg he had complained of as feeling "queer," and as if they had "pins and needles." On awaking in the morning after these sensations he found to his dismay that he had utterly lost the power of his right arm and leg. The right side of the face then looked long, smooth, and blank. The left angle of the mouth was drawn up. There was not any dropping of the upper eyelid. On the 13th of May the leg had so far recovered its motor-power that he could with assistance walk. But he could not in the least degree move the arm. On the 14th, about midday, he suddenly and entirely lost the power of speech, and also the power of deglutition. For the next twenty-eight hours he could not swallow a morsel of solid or a drop of liquid. After that time the function of swallowing began to return, and he slowly got down a little beef-tea. During the following six days he lay in bed apparently without pain, but with the abolition of articulate language; nor could he write. There was no history of cranial injury; the physical signs of the heart and great vessels were normal. There had been no puffiness of the face in the morning, no swelling of the ankles in the evening, and the urine, when tested, exhibited no abnormal products. There was no blue line on the gums, nor had he had any symptoms of saturnine poisoning, but on admission the gums were red, swollen,

and vascular; and there was the mercurial fœtor of the breath. Again, there was no indication of retinal degeneration. Tickling the sole of the foot was not followed by reflex action. On careful percussion of the spinal processes not the least tenderness could be discovered. Before he came into the hospital he had been well purged, and mercurials at short intervals had been given, and a blister had been applied to the nape of the neck. These remedies, however, had not been followed by the least relief. The facial expression, in addition to the loss of articulate language and the agraphia, was that of much confusion of ideas. He could not protrude the tongue, and when he drank the fluid passed through the nares precisely as in diphtheritic paralysis. The motor-power of the leg was again wholly abolished, and he could not move the arm in the least degree. On examining the genital organs an indurated chancre was situate at the under edge of the glans penis; further investigation showed ragged ulcers in the throat. The cause of the hemiplegia was at once revealed. There was marked anæsthesia in both of the affected limbs, he could not tell when one or both points of the callipers were applied. The bladder had lost its expulsive power, and he had to be lifted in and out of bed. He was ordered full doses of the iodide of potassium in a bitter infusion, and extra diet with wine and porter.

By the 5th of June, fourteen days after admission, improvement was very manifest. He could then partially protrude the tongue; the anæsthesia in both limbs was less pronounced, and there was more motor-power in the leg, but none whatever in the arm. The retention of urine continued, and the bowels were, as they had been since admission, constipated. In one week after the fore-named date, 5th June, he could sit by the side of his bed in an arm-chair, and could articulate certain words so as to be understood. He could say "good," "home," "day," "yes," and "no," and when asked to name the place from whence he came he could in some measure pronounce this, a dissyllable, word. In a fortnight afterwards, his improvement had become considerable, he could then fully protrude the tongue in straight direction, there was no retention, he had no sore throat, could slightly move the arm, and he could gently walk about the garden. Though he could write a little, the faculty of speech was only partially restored. When he attempted to speak it was in slow and guarded manner, as if with an effort; his utterance was thick, and the words were very indistinctly pronounced. He still took the iodide of potassium, and faradization was daily applied to the upper part of the spine and the laryngeal muscles. On the 5th July he could lift his arm to his head, and the speech was clearer. On the 12th of that month he was discharged, after having been an inmate of the institution fifty-two days. When he left the hospital he could walk with scarcely any perceptible lameness. The arm had well-nigh regained its natural motor-power, nor was there in either limb any anæsthesia. Though the faculty

of articulate language was re-established, nor was there absolute forgetfulness of any word, the speech was thick. He spoke as if he had a common cold with relaxed sore throat. The larynx normally moved upwards in deglutition, and from his perfect capability in drinking it was evident that the velum and uvula had regained their functions. He fully recovered and became strong and vigorous.

Syphilitic hemiplegia is far less common than hemiplegiæ referrible to other and more ordinary pathological causes, and it is always most important to distinguish it from the usual examples of this form of paralysis, because the complaint indicates a specific treatment. It was not until a comparatively recent date that those particular morbid changes in the encephalon, the cord, and it may be added, in the roots of the spinal nerves, consequent upon the syphilitic poison, were so fully as they are at the present understood. It must, however, be admitted that in exceptional cases the causes of hemiplegia, in this as in other illustrations of the disease, even with all the advantages of examination after death, are by no means clear; that there is a want of correlation between the injury of the cerebral tissue, particularly of the breaking-up of the motor-tract and the morbid phenomena, just as we know it may sometimes occur that a patient may die comatose, and no other explanation be given post mortem than turgor of the cerebral vessels, and, too, when there has been no renal disease, no lead or other poisoning. From the time when M. Robert first gave a lucid account of syphilitic hemiplegia certain pathological facts still hold good, and it is still the right side which is affected with but scarcely any exception. Russell gave an example in which cerebral symptoms were followed by an apoplectic seizure, with convulsions, hemiplegia, and rigidity of the left arm. Burdel narrated another case of this kind. Pitman, some time ago, gave seventeen cases of paralysis associated with syphilis. Diday described syphilitic aphonia. The writings of Hughlings Jackson have by numerous examples shown how syphilized patients are liable to nervous affections, and that physician prominently speaks of this sequel.

Modern pathology emphasizes the doctrine that it is one marked peculiarity of this specific poison to manifest a proneness to the generation of a new fibro-plastic product, which in various organs may be deposited as gummata, or in more diffused manner may be infiltrated into the tissues. This amyloid or albuminous material is most liable to elect as its seat of location the liver, but it is also thrown out in the brain, the dura mater, the spinal cord, and the nerves, as well as in other organs. The nodules thus formed by their bulk and pressure either in the great nerve centres, or their investments, or along the nerve tracts, would fully and obviously account for abnormality in the more entire arrestment of function. There is no doubt these effused masses of morbid material are more commonly a result after the system has been long and repeatedly saturated with the syphilitic poison, and more especially after the

osseous textures have been affected, because between the product and the lardaceous generation there is a great resemblance, and because observation has proved the truth of the remarks; still, as in these two young men, it is presumptive that some latent idiosyncrasy, even when the system had not gravely suffered from the poison, may favour the elimination of this peculiar material.

XXXIV.

SCORBUTUS.

THERE is often much incorrectness displayed in the employment of this term, and it is a name given to several skin affections which have no sort of relationship to this disease. It is now comparatively a seldom seen complaint, and those examples which are met with in ordinary practice and of the inland description are of the milder form. Many years ago a man, aged forty-seven, came under my care, who looked pale and emaciated, the volume of flesh was reduced, and the muscles felt flabby and resistless. I first saw him on the 8th of January. He stated that for some years past he had laboured under considerable indigestion, which had been accompanied with some pain in the epigastrium and hypochondria; had consulted several physicians, but without any benefit; during the two years previously his diet had almost entirely consisted of stale wheaten bread and tea; said that he could not digest animal food, and in the period mentioned had never taken any, with perhaps the exception of occasionally eating a very small quantity of mutton; for years had not been able to eat a full meal; a sense of fulness and distension had long been experienced after eating; pains in the head, chiefly near the frontal region, invariably followed taking food. The gums, without any assignable cause, gradually became tender and vascular-looking, this symptom by degrees increasing in intensity until the time I saw him, when they were red and spongy-looking, and constantly bled; soft food can now only be taken on account of the affection. On the anterior aspect of the right thigh, four months before, a number of small ecchymosed-looking petechiæ were observed, varying from the size of a flea-bite to that of a No. 4 shot; these came gradually, disappeared, and were succeeded by others of a like character. The left thigh in the course of a few weeks after assumed the same condition. On the internal aspect of each thigh, a little above the knee, and corresponding with the lower half of the femur, two dark, large, livid patches made their appearance; their colour was of an inky blue, and they seemed as if they had been produced from a violent blow from some even-surfaced body; they have maintained the same characteristics; the one on the left thigh measured about six inches by four; the one on the right was somewhat smaller. The inferior extremities were œdematous, and the

knee could not be flexed without the feeling of considerable tightness and pain; at the flexures of both, the skin felt tense and indurated; no discolouration; looked rather paler than natural; right knee swelled; bowels often relaxed, fæces being lighter-coloured than normal; complained of no tenderness on pressure in hypochondria or epigastrium; said he often experienced some degree of pain over the umbilicus; skin felt dry and harsh; pulse soft, of tolerable volume, seventy-four; tongue paler than natural, and covered with a dirtyish-white coat; lips blanched. Had taken no medicine for some months, with the exception of an occasional dose of the common aperient pills.

Ordered strong concentrated soups, and puddings of sago, rice, etc. (these to be varied as much as possible), and fresh green vegetables.

R. Quin. Sulph. gr. v.; Acid. Sulph. Dil. dr. iss.; Tinct. Card. Co. oz. ss.; Infus. Calumb. oz. viiss. Sit mist. cujus capt. oz. ss. ter die in aqua.

18th.—Felt in all respects better; soups and puddings had not disagreed with him; gums not so tender, and less spongy, more naturally contracted, and reported not to have bled so much; eruption less distinct, and the large ecchymosed patches assumed a yellowish tint. Ordered rabbit, fish, or fowl and fresh vegetables to be taken; also three ounces of port wine daily.

Repet. mistura.

February 21st.—Much improved in every respect; countenance more healthy; gums to appearance almost natural. Could take his prescribed diet without being affected with uneasy distension at the stomach. Livid patches fast disappearing, and petechiæ well-nigh gone; less swelling and stiffness in the extremities; bowels moved in natural frequency, and stools improved.

Contin. mistura tonica et vinum rubrum.

March 29th.—Could now eat mutton to satiety, without suffering from pain in the stomach as previously. Took bottled porter every day to his dinner. Enabled to go out every day, and walked much better.

R. Tinct. Ferri Perchlor. dr. j.; Aquæ oz. vj.; Tinct. Hyosc. dr. ij. Sit mist.; capt. oz. j. ter die.

April 20th.—Well, and pursued his occupation.

REMARKS.—On reference to the writings of all authors who have described this disease, particular allusion is made to the great prevalence of scurvy in former times, before its nature and treatment were so well understood as they now are. Amidst maritime communities the affection is by far the most common, and our naval history of the last century gives the most appalling details of its ravages, which were sometimes so fearful as to threaten the entire destruction of a fleet, and often making far greater havoc than the most sanguinary battles. So remotely back as the time of the holy wars, mention is made of the complaint, and it is pretty certain, from various sources of information, that it prevailed in the kingdoms of northern Europe prior to that date. Some of the older writers state its occasional epidemic occurrence in this and other countries; and

during some of these visitations many were swept off by the disease. There is one fact now thoroughly substantiated, that of all the alleged conditions entering into the causation of scurvy, diet lacking a proper proportion of acid fruits and succulent vegetables is immensely the most important—a truth that has been abundantly corroborated by positive and negative proofs. Trousseau says it is a complication met with in some epidemics, and then the symptoms by which it is accompanied are a tendency to syncope, spots of purpuræ, epistaxis, hæmorrhage into the bronchial tubes, stomach, intestines, and bladder. Berger and Delpech say a good diet of fresh meat will not keep off the disease, if there be deprivation of acid fruits and vegetables. To some of our naval commanders is justly due the greatest credit for their correct and philosophic observations relative to many important particulars associated with a study of the affection. Being men accustomed to habits of reflection, and exceedingly desirous to banish from their crews so destructive an assailant, they carefully watched its progress and decline, tried different remedies, and endeavoured to trace to its true cause the rapid recession which it would make when the ship reached a distant port, and the diet of the men thus became changed; it was in this manner that the wonderful virtue of the acescent fruits and fresh vegetables was unequivocally established. Military medical and other records also furnish us with instances of its calamitous occurrence amongst the troops; and these have generally occurred after the men had been debilitated by long and laborious campaigns, and when so circumstanced as to be unable to procure the proper amount and right kind of provisions. Fodéré tells us that the soldiers in the army of the Alps suffered by it very severely, and Larry remarks the prevalence of scurvy during the siege of Alexandria. At the close of the Punjab campaign, though the troops had an abundance of good food, it occurred; but they had no fresh vegetables. In the second Burmese war it appeared under precisely the same dietetic circumstances, and rapidly declined when lime juice was served out to the soldiers. Opitz mainly attributed an epidemic of the disease amongst the Austrian army to damp and cold and crowded barracks. During hard winters cases are occasionally met with amongst the London poor. The reports, which during later years have been given to Government authorities, relative to our prisons, gaols, and hospitals, have attested the fact that error in kind, or insufficient quantity, of diet constitutes the most fertile of all causes in the production of scurvy. The general failure of the potato crop many years ago undoubtedly gave rise to an unusual prevalence of the complaint in question—a position which those who saw much of the mode of living amongst the poor, the immensity of their destitution, and the general distress which the loss of this valuable article of food gave rise to amongst them, could indubitably attest. Whatever lowers the forces of the organism predisposes to scurvy. Young and weakly people are most prone to it. Old people and children are only sometimes

affected. The more temperate lives of women and their greater psychical powers of endurance render them less liable to it. Paradoxical as it may seem, the exclusive use of salt meat does not always produce it, and it is known that amongst those who live almost entirely upon vegetable diet it will sometimes appear, and in support of this Niemeyer instances its occasional prevalence amongst those who suffer from destitution and live in cold moist cellars, as such is the case in northern countries, especially in Russia.

Turning from these general observations and confining these brief remarks more particularly to the case now given, it will appear manifest that causes brought into operation in a solitary case, from a combination of circumstances of a nature similar to those where this influence extends to numbers, were followed by like results; and, as the sequel will show, such clearly consisted in an improper and scanty food. The patient having long laboured under dyspepsia, had for that complaint sought the opinions of various practitioners, and the last under whose care he was previous to my being called in, strongly recommended one description of diet, which, as he fallaciously conceived, was indicated until the digestive organs had fully regained their tone. As stated in the report, for two years the individual had lived chiefly upon *stale bread and tea*, and when I first saw him, his stomach had become so debilitated that most other kinds of food could not be taken without producing distention and disorder; if he eat a full meal it was sure to render him very unwell. I may here mention, that amongst the working classes there is a description of dyspepsia produced by individuals living so much upon slops, which their straitened circumstances compel them to do, and which those practitioners who have had much communication with the poor cannot fail to have noticed. Amongst many of the poor, tea and cake or bread form the staple articles of diet; and these persons, when they apply at the hospitals and dispensaries, complain of watery eructations, flatulence, gastric distention, and cardialgia; the pulse is soft and resistless; bowels torpid; and frequently there is flabbiness of the muscles, with more or less of general emaciation; and the patient upon being interrogated will often say that any other kind of food produces pain in the stomach and much uneasiness. I recollect that Dr. Hughes Bennett first pointed out this fact particularly to my attention. He also told me that he had not long before attended a case very illustrative of this fact. A young lady who resided at Montrose came to Edinburgh to obtain advice for a stomach disorder, under which she had long suffered, and placed herself under his care. On being interrogated, she asserted that *tea and bread* were the only articles of food she could take. She was weak and emaciated; had become nervous and irritable; the bowels were disordered; and she complained of flatulence and cardialgia. Dr. Bennett prescribed mild tonics, ordered her to take no more tea, and to have a varied and animal diet, under which she rapidly recovered. Those practitioners who reside in rural districts will bear me out in the foregoing

statements, that amongst the labouring poor the disease in question is very frequently met with; and so far as my own experience warrants in giving an opinion, restriction as to the quantity of warm liquids, the daily allowance of fresh animal food, and ten or twenty drop doses of the diluted sulphuric acid, in an infusion of calumba, or in water, is a very successful mode of treatment. Considerable quantities of liquids cannot fail to impair the digestive organs; first, by diluting too greatly the gastric juice, and thus preventing that reductive action upon the food so necessary in this the first stage of digestion, the parietes of the stomach become morbidly distended by the evolution of gases; the contents of the organ are propelled, insufficiently acted upon, into the duodenum and lower parts of the alimentary canal, and the conversion of the ill-formed chyme into chyle is imperfectly performed; the bowels become disordered from the passage of undigested matters; hence diarrhœa or constipation, caused by irritative action on the digestive surface, or the collection of crude matters. I well remember that Sir Robert Christison used to say it was his opinion from long observation that in the instance of convalescents from fever and other acute diseases, and when the patients declared they could not digest soups, that small quantities of well-cooked mutton could not only be taken with impunity but with benefit. This observation I have in practice long acted upon, and in many instances well-selected solids can be taken when liquids disagree. The circulation being in a secondary manner rendered slower, the liver becomes engorged, and disorder of the biliary apparatus is superadded to the morbid conditions already existent; and so it is, that whenever there is chronic dyspepsia, the practitioner may rest assured that the functions of the hepatic viscus are more or less at fault.

It has been said that the patient whose case is now particularly considered, lived, during two years, mainly upon one kind of food, under which those symptoms that could not fail to follow succeeded, and scorbutus was the result. When I first saw him, the bodily powers were much reduced; the eye looked dull and listless; lips blanched; cheeks fallen; gums mottled and vascular; teeth loosened; extremities swollen; petechiæ, and dark hæmorrhagic patches, were also manifest, and it was too obvious that unless some amendment was ere long produced, a fatal termination would ensue.

Between purpura and scorbutus there is an essential difference, notwithstanding some nosologists having considered them identical; and this difference appears indisputable from the following considerations:—Because scurvy comes on at certain periods, at least, whenever it is considerably prevalent during particular seasons; scurvy comes on gradually; purpura often quickly; in the one, spongy gums invariably are seen; in the other this is not the case. Purpuric spots though small are numerous; they are most common on the extremities, and when the first set are passing through the blue and green stages new red spots appear. There are not the large

bruise-like discolourations which are noticed in scurvy. Purpura ends in three or four weeks. Scurvy may go on for very long periods. In scorbutus, acid fruits and succulent vegetables will alone produce a cure; in purpura they are taken without effect. Hence, from these facts it cannot be said that they are really the same, although admitting of many similarities.

The study of those morbid conditions in the system which give rise to scurvy renders them of deep interest to the pathologist, because its study shows that a primary change in the blood will readily affect the entire system, and produce morbid anatomical conditions of the gravest character; and, indeed, a reflection on these changes inclines us to think with less prejudice on those humoral doctrines with which the minds of the older physicians were so much imbued. Some writers have affirmed that scurvy was dependent upon capillary distension; but experiments have tended to an opposite opinion, because, when a limb has been injected, the extravasation, if any, that has been produced, was not discernible to the naked eye, either in the integuments or in the sub-cutaneous cellular tissue, or between the muscles. If it were dependent upon capillary distension, it would not be too hypothetical to presume that the nervous system, the vasa-motor nervous influence, was the primary seat of the disorder, because the nervous fibrillæ which supply the extreme vessels with nervous energy, improperly performing their functions, the vascular extremities acquire a tonic fulness—a fact that has long been established by positive and negative proofs. For instance, in fever the capillary system sympathises with those changes which are produced in the great nervous centres,—a doctrine propounded by Hoffman, and established by Cullen. Again, in those cases of apoplexy described by Abercrombie as *nervous apoplexy*, the extreme vessels are affected, but in a manner opposite to that which they are during the febrile paroxysm; the brain, from a diminution of nervous power in itself, fails to transmit the requisite nervous energy to the fibrillæ; the walls of the capillaries are resistless, and aqueous transudation of their contents takes place, and thus occurs that not uncommon symptom of copious perspiration. From a consideration of these facts, we cannot refer the true cause of scurvy to disease in the capillaries themselves. That the blood is in a vitiated condition, and that the other phenomena are entirely dependent upon its morbid changes, certain considerations tend to prove. In all the *post-mortem* appearances which I can find given of this disease, paleness of the tissues is particularly mentioned, consequent upon diminution of red particles; and as physiologists have unequivocally exemplified, that the vitalizing influence resides in these particles, their diminution must give rise to diseased conditions of a more manifest and general character. These red particles are derived from the materials produced by digestion, and require certain constituents, but if the ingesta are such as not to yield the requisite constituents in due quantity the elaboration of the particles must needs be imperfect,

and the portion given off unequal to the imperative demands of the system; hence the loss of vitalizing power and the conditions which constitute the disease. Acid juices and succulent vegetables, by possessing these elements, promote the cure. In scurvy the occurrence of syncope is one of its symptoms; now in anæmia and chlorosis the same occurs, and in the latter we know that the red blood-globules are diminished, sometimes to even one-fourth of their normal quantity, and in such instances syncope is a common symptom; hence, from similar causes similar effects. The first indication of scurvy is a tawny dulness of the skin, manifestly proving that the blood is primarily diseased, and that to its lesion we must refer its true pathology. The microscope cannot in scurvy, as in chlorosis and other lesions of that fluid, detect any abnormal conditions. Niemeyer regards the first morbid state as that of imperfect nutrition of capillary walls consequent upon loss of their proper nourishment. The density of the blood is diminished, and it doubtless has an increased tendency to exosmose. Much obscurity, however, is still acknowledged pertaining to the fundamental pathology of the affection.

It being conceded that the blood is in a morbid state, the next question which may be asked is,—how are the petechiæ, vibices, and hæmorrhagic patches produced? It is a physiological fact, and one that has long ago been pointed out by Le Gallois, and other inquirers, that the action of the capillaries is imperfectly carried on unless they receive a stimulus from their contents, and this stimulus can alone be properly produced from healthy arterial blood; therefore, when their stimulus is diminished their functions become impaired, and congestion and extravasation result. There is doubtless a deficiency of those minerals, which are needed for these proximate principles by which the organism is formed, which are phosphorus, sulphur, lime, potash, and soda. Garrod believes the loss of the normal amount of potash to be the main cause of the disease. Opitz found the blood alkaline, and the normal amounts of albumen and salts diminished. Chalvet says there is an increase of fibrin and a decrease of the blood corpuscles, and that the water and the albumen are augmented. Leven discovered fibrin in excess, and the blood-globules in the proportion of only one half of the natural quantity.

On reference to the above case it is seen there was œdema of the inferior extremities, with indurated thickening of the integuments at the flexures of the knees, conditions almost invariably present in true instances of this disease. These morbid depositions are by far most common in the inferior extremities, in the subcutaneous cellular tissue, and between the muscles, and are in some measure dependent upon gravity. From whatever cause debility of the circulatory function is produced, swelling of the legs is a probable result, dependent chiefly upon gravity; but in this disease there is a morbid state of the blood itself, as spoken of above, which must considerably favour such result. Some chemical pathologists

have affirmed that there is positively an abnormal increase of fibrin in the blood of scurvy patients—a statement, unless well authenticated, that appears doubtful, because, although the coagulability is not destroyed, it is certainly less than in healthy blood; while the solution of continuity in the cicatrices of old ulcers argues powerfully that the plastic properties of the fluid are diminished. Those who have propounded the doctrine of excess of fibrin, base their opinions in some measure upon the circumstance of abnormal organized depositions being common in various parts; but the languor of capillary circulation, the rupture of the capillaries, together with the effects of gravity, seem sufficiently to account for the morbid anatomical characters in question. In those cases in which there is a rapid circulation, fibrinous effusions are more common than when the pulse is slow. The brawny thickenings when incised are found to consist of altered and effused blood, and blood may be effused into the substance of the muscles and into the inter-muscular tissue. The viscera and the alimentary canal may reveal ecchymoses; the heart may be tawny and there may be infarctions of the lungs and spleen, and the last named organ is often large and flabby. In the article on Splenitis I have noticed the similarity between the condition of the blood in scorbutus and in chronic splenitis. In the second stage there may be hæmorrhages into the joints, under the periosteum, and there may be separation of the cartilages. Hæmorrhage into the joints and with the accompaniment of diarrhœa is most unfavourable. Effusions into the pericardium and the cerebral cavities generally end in death. In bad cases the blotches are purple when superficial; and when they become older and deeper they assume green and brown changes. Mental and physical lassitude, exsanguine appearance of the gums, or when they slough, dyspnœa and the supervention of those forms of amaurosis termed hemeralopia and nyctalopia are most unwelcome conditions.

The constantly relaxed state of the bowels, and the light-coloured stools, in the instance of this man, are symptoms highly indicative of the complaint. As he improved the evacuations became more natural.

Soon after my attendance on this person, other cases of scurvy came under my observation, but these were of the milder form of the disease, and being treated at an early stage, were soon, under ordinary remedies, restored to health. The cases referred to were confined to the lower orders, and attributed to the scarcity of potatoes, upon which the poor are so dependent as a chief article of food. It having previously been pretty clearly shown that the loss of this vegetable gave rise to the unwonted prevalence of the disease, I will not here enter upon a question which Einhoff, Vauquelin, and others, have from their chemical researches satisfactorily explained; but I may add, that in those cases which I saw, the individuals for months before had been unable to procure the potato as an article of diet.

XXXV.

ERYTHEMA CIRCINATUM.

A STOUT muscular woman, a domestic servant, single, and forty-eight years of age, was admitted into the Tunbridge Hospital on the 31st of May. Five days previously she had begun with all the ordinary symptoms of acute rheumatism, and had been attended by the house-surgeon as an out-patient. On admission several of the larger joints, and especially the knees and right wrist, were swelled. There was no cardiac complication, but the systolic sound was shorter and less loud than natural. On the lateral aspect of the right arm, and immediately below the elbow, was a round, clearly defined, slightly raised patch, two and a-half inches in diameter, and of brownish damask-rose redness. The centre had a yellowish tinge, and there the epidermis had become broken and shrivelled, and was being thrown off in furfuraceous desquamations. The back of the right hand was rose-red, bounded transversely by a clear line which described the segment of a circle. The back of the thumb and the back of the middle finger were of the same colour, the palmar surface of each being of natural appearance. On the anterior part of the left leg, extending up over the lower two-thirds of the tibia, and two inches in width, was an erythematic blush of purplish hue, the skin being slightly raised, but the margins were less distinct than the previously described patches. On the side of the right knee joint, and on the lateral aspect of the left leg, were similar rose-coloured patches, some of which, in the centre, were becoming yellowish. The statement of the patient was that these places began to appear soon after the cessation of the pains in her limbs, and simultaneously with the enlargement of the joints. She was put under the alkaline treatment, in combination with the ammoniated citrate of iron, had Dover's powder at bedtime, and was ordered to lie between blankets. A powder was prescribed for the spots consisting of one part of the oxide of zinc and three of powdered starch. Under this treatment the acute rheumatism soon began to subside, and with its declension the patches began to fade. As the coloration of the spots became less vivid, they assumed a yellowish tint, and the cuticle proper to their extent desquamated, in branny whitish scales, the cutis vera lost its tenuity and the elevation disappeared. When this peculiar

form of erythematic inflammation has been observed, it has generally been in examples of acute rheumatism.

Not long ago I saw in the instance of a young girl, who had also acute rheumatism, an exceedingly well-marked illustration of erythema papulatum, which occurred on the backs of the hands, fingers, feet, and toes. The affection closely resembled chilblains. At some of the parts mentioned the spots had become aggregated into thickly set patches like the reddish, livid, port-wine stains of purpura. The rheumatic diathesis is that condition in the system which is most prone to the development of these forms of erythematic inflammation.

XXXVI.

LUPUS ERYTHEMATOSUS, TREATED BY LEMON-JUICE.

LUPUS generally comes on between puberty and the thirtieth year; is a chronic disease of the skin; mostly seen in scrofulous subjects; in those of lymphatic temperament; and is nearly always presented on the face, and more especially on the nose and cheeks. In some exceptional cases it may be seen in other parts of the cutaneous surface. Systematic writers have classified it under three denominations:—viz., the erythematosus, the pustular, and the tubercular. The example about to be recorded was in the instance of a well-formed, muscular young woman, single, a domestic servant, of florid complexion, and twenty-three years of age. She said she had had the affection from infancy, and at various times had consulted a large number of doctors. The right cheek, as far as the ear and down to the edge of the lower jaw, presented the unsightly appearance of chronic lupus. The diseased parts were of brownish red, and at most places the skin looked tense, smooth, and shining. On closer examination a number of slightly raised eminences, of two or three lines in diameter, were observable, which were soft to the touch, and looked of jelly-like consistence. Certain of these tubercular elevations were streaked with vascular ramifications, and at various points the epidermis was peeling off in whitish furfureous scales; at other points were some open sores, which secreted a clear serous fluid. At certain places the cutis vera was raised and hypertrophous, and was of reddish salmon colour. At the margins shining white cicatrices were left. The patient had been treated with various remedies, but without deriving much benefit. She was ordered to take the juice of three lemons daily. In one week improvement became most manifest. The remedy was continued in conjunction with cod-liver oil, which she had taken before at long intervals with other medicines, but with little advantage. The face rapidly became wonderfully better; and the improvement continued, so that in less than a month the face was in a more healthy and natural state than she ever remembered it to have been. I, not long ago, had a case in private practice illustrative of the beneficial effects of lemon-juice in this obstinate affection. This was in a middle-aged woman, who for six years had this form of lupus, and who got quite well.

XXXVII.

PUERPERAL CONVULSIONS.

THOUGH many years have passed since these illustrative examples of a grave and often of an alarming malady occurred, I have not hesitated to give them a place in this work. They are most characteristic of the kind of phenomena which are presented when convulsions come on during the time of parturition, and exemplify how that energy and decision are imperatively demanded in order to avert that which not unfrequently takes place, a fatal termination. Again, they demonstrably show that the now almost discarded practice of venesection can under properly selected cases and in dangerous emergencies not only be had recourse to without harmful effect, but be succeeded by incontrovertible, obvious, and manifest benefit.

CASE I.—I was hastily summoned at two o'clock in the morning to see a young and an unmarried woman, who was represented to be in labour under the charge of a midwife, and very dangerously ill; indeed, so precarious was her condition according to the messenger, when he was despatched, that he thought it highly probable she was not then alive. On arrival I found the patient to be a stout, muscular, short-necked person, apparently three- or four-and-twenty years of age, lying on a bed in a state of unconsciousness. Her mouth and lips were besmeared with blood, and her looks seemed vacant and unnatural. It was stated that she had had lingering pains during the previous day and night, and that up to an hour before she was suddenly struck down in the first fit she had not given manifestations of any particular symptoms; she then complained of headache, which became more violent, and speaking of this a few moments before she fell down, she described it as being so intense that she felt as if her head were "opening and shutting." Two hours before this occurrence the pains were strong and much more powerful than they had been; they then almost entirely ceased. She had had four fits before my arrival, and during the intermissions she was scarcely, or not at all, conscious of what was passing around, or of her own condition, and tossed about the bed in a furious manner. Immediately after I had entered the room another paroxysm came on; the eyes became everted, the countenance greatly congested, the hands

powerfully clinched, and the whole frame convulsively shook in alarming degree, whilst the foaming at the mouth and stertorous breathing added to the grave character of the scene. Her agitation and continuous efforts to throw herself off the bed were so strong that it was with difficulty that she could by two or three persons be restrained. The features quickly became darker, and the attack continued for a considerable period. After the fit had terminated the body was raised in the semi-erect position, thus favouring the return of blood from the head. I then, as she was now somewhat tranquil, opened a vein in the arm by a large orifice, and at once freely abstracted blood. The pulse before bleeding was full and bounding, and increased in frequency. On introducing the hand the os uteri was fully dilated, and the membranes entire. Snow being on the ground, this was constantly applied to the head, and a thorough current of fresh air emitted through the apartment. Appearing now somewhat easier, the breathing being performed with less difficulty, I decided at once on delivery. The hand was carefully introduced, and the child turned and born in from twelve to fifteen minutes. Thirty drops of laudanum were then given, and the head ordered to be shaved immediately. She continued in a tolerable state of composure for four hours, at intervals having a short sleep, during which she would murmur in a low muttering delirium, and on suddenly awaking would distressingly moan, roll her eyes, and speak in a quick incoherent manner, frequently changing her position in bed, and strenuously endeavouring to get up, and at seven a.m. another violent paroxysm came on characterized by the same symptoms as the former. She was treated with opiates, and antispasmodics, counter-irritation was applied from time to time to the nape of the neck and the legs, the bowels were carefully kept unloaded; terebinthinate enemata in gruel were administered, and occasionally cold was applied to the head. A carefully selected and nourishing diet was allowed, and she was ordered to be kept as quiet as possible. At the end of five days another fit came on, but that was of far milder character. After this she had no more attacks, and at the end of three weeks from the time of the accession of labour she was quite well.

CASE II.—The second example was in a single woman, aged twenty-four, of low stature, broad-set frame, and the muscular system was well developed. Hair dark, neuro-phlegmatic temperament, and looked healthy. At three o'clock in the morning she was awakened somewhat suddenly from her sleep by incipient pains of labour, which continued at intervals, and increased in power up to eleven o'clock, the time at which I first saw her. On making an examination, the head was tolerably low down in the pelvis, and the os uteri was dilated to not more than the size of a shilling piece; parts quite cool, and well lubricated. Patient stated the waters had broken early in the morning; this, however, was manifestly incorrect, as the membranes could be distinctly felt entire.

At half-past twelve I was sent for in great haste, it being reported that the pains had now become very frequent and much stronger. On my arrival the os uteri was almost entirely dilated, pains, however, now abated, and for some time she remained *in statu quo*. She had three or four pains, which were not very severe, after I had entered the room, and to all appearance everything was progressing in the most satisfactory manner, and she was partially reclined on the bed; at this moment my attention was quickly directed to the patient by the nurse, who was standing by her bed side, and who in her alarm shouted, "She is in a fit." The eyes were everted, the hands firmly clinched, and the entire muscular system in a state of rigidity. There was no foaming at the mouth, little, if any, tossing about of the head on the pillow, no stertor, and the paroxysm was of short duration. Cold was applied to the head, though this did not seem particularly indicated, as the surface generally was not above the normal degree of temperature, nor was the os frontis, but as we frequently, during such paroxysms, observe it. Whilst the fit continued, the countenance was much congested, and assumed a dark rose-red; the eyes were suffused, and seemed fierce and glassy; the pulse slow, and though of small volume, of tolerable strength. Considering it desirable that the child should be born as soon as possible, the short forceps were applied and the child was readily extracted. The placenta was removed in a few minutes afterwards, with scarcely any loss of blood. She remained from the time of the fit insensible, and spoke with vehement incoherence. The eyes were wandering, and gave a vacant expression to the countenance, and she constantly stared about as if in bewilderment.

In the first half hour after delivery she had five fits, each characterized by the same phenomena as the one described, but of a milder description. Venesection was resolved upon, and a moderate amount of blood extracted. Stimulating liniments were applied, opiates given, and turpentine injections administered. Symptoms of amendment not becoming so manifest as desired, voltaic electricity was tried, with a view if possible to rouse the central organs of the nervous system. She soon expressed herself as being better, and seemed more collected. In a quarter of an hour after the wires were discontinued, the pulse was of improved strength and volume; the skin generally grew warmer, the looks were more natural, and she now answered questions rationally. The first paroxysm was more of a convulsive character than those which followed, doubtless from the greater irritation given to the system by the continual efforts of expulsion. In this case hysteria was a prominent symptom, and the attacks assumed the hysterio-epileptic character. The os uteri, considering she was a primiparous female, with unaccustomed suddenness became dilated. The first fit was just at the time when the os was about to acquire its full expansion, immediately before the termination of the first stage, a circumstance worthy of notice, as all obstetric writers agree that puerperal fits by far

more commonly supervene shortly before the entire dilatation of the womb. Again, the parts being so cool there was nothing to lead to the supposition that any untoward event would occur. The pelvic outlet was not by any means contracted, the presentation was natural, the pains came on at regular intervals, the patient did not complain of any head affection, and altogether it was fair to pronounce that the delivery would be of a favourable description.

Visiting her next morning, she had slept but little during the night, and until three o'clock was loquacious and wandering; had no fit since the afternoon; pulse 66, of better strength; quite sensible, and expressed herself as improved. Upon inquiry stated that she had had considerable headaches during the first two months of her pregnancy; never had any fits before, at any period of her life; always enjoyed good health; urine, up to the time of her delivery, had always appeared natural, and voided in proper quantity; bowels had often been confined during the last two or three months, and said that last week were a good deal constipated; the previous morning diarrhœa came on, and she was purged three or four times; she had headache (chiefly over *os frontis*,) and that at times she fancied everything turned round. Did not remember her delivery. Urine voided normally, of specific gravity 1.010, did not coagulate by heat; nitric acid produced no effect; litmus paper unaltered. No trace of albumen.

Half-past one p.m. Summoned in great haste, it being reported she had had in quick succession three fits, which were pretty similar to those on the previous day. No foaming at the mouth. On my arrival was sensible; countenance red and flushed; skin hot; pulse of better volume and strength; tongue rather dry; eyes a good deal injected; head hot; some lachrymation; pupils normal.

Three days afterwards she had a return of the fits, but these were of milder description, and after that time they did not again supervene, and at the end of a fortnight she had made a full recovery.

REMARKS.—There is not an affection more alarming, nor one in which promptness and energy are more imperatively demanded, than an attack of puerperal convulsions. Procrastination in our measures, and an imbecile line of treatment, are often attended with disastrous results. Before this disease was so well understood as it now is, not more than one-half or one-third recovered. In the seventeenth and eighteenth centuries it was regarded by the physicians of those times as a well-nigh always fatal disease. Hunter, Jacobs, and others affirmed that more than fifty per cent. invariably died; indeed, they considered it as one of the most fatal of complaints. Comparing such statements and the degree of mortality with the present notions of the affection, and the ratio of deaths that now occur, under different pathological views, the results are very much more successful. Dewees classes puerperal convulsions under three heads, namely, epileptic, hysteric, and apoplectic forms. Baudelocque arranges

them under the titles of tetanus, epilepsy, and catalepsy. Merriman styles them *dystocia epileptica*; while Velpeau and Desormeau prefer the general term *eclampsia*.

Puerperal convulsions usually occur during one or other of the stages of labour, or immediately after parturition. They may also come on at any period during the latter half of pregnancy; such, however, is far more rare than the former. The most frequent of all times is a little before the termination of the first stage, when the os uteri is becoming fully dilated. This affection may also take place at any period within the first twenty days after labour, but such is more uncommon, for after the uterus has expelled its contents, and so long a time as ten days or a fortnight elapsed since delivery, the supervention of the convulsive paroxysms is but seldom noticed. In the instance of this person it is seen that the first fit came on immediately before the os became fully expanded; and it is also worthy of remark, that five days after her delivery another fit came on, although there was no return of the paroxysms from the period of parturition to that time. With regard to the dilatation of the uterine orifice, I am aware some authors have affirmed that a fit will supervene when scarcely any signs of labour are present, and in a few minutes after such fit, not only will the parts have become sufficiently dilated, but the child be immediately born, owing to the excess of muscular action. Such statements may be regarded as an exaggeration rather than as a simple declaration of facts, for it will generally, if not always, be observed, that where the fœtus is so precipitately expelled, the os had some time before been gradually becoming patulous.

It may here, too, be mentioned, that the affection is much more common in primiparous females, than in women who have previously borne children. This patient had never before been confined. In other cases which I have known the majority were in the first confinement. Collins, in an account of thirty cases, says that twenty-nine were first-births; and of thirty-six by Merriman, twenty-eight were first births. Cazeaux says seven out of eight cases of *eclampsia* occur in primiparæ; and Trousseau remarks that the influence of a first pregnancy on the production of *eclampsia* as a predisposing cause is a fact admitted by most accoucheurs. We can readily conceive that the first time nature accomplishes this process, her efforts will have a more severe effect upon the animal economy than when the parts have been previously distended; the impressions made upon the nervous system give rise to greater excitation, and the mental disturbance which ranks amongst the acknowledged causes exerts a more powerful influence upon the body.

CAUSES AND PATHOLOGY.—Pathologists have found it difficult to determine which are really the remote and which are the proximate causes; indeed, on this head there is much difference of opinion. Amongst the remote causes, however, irritation transmitted to the great nervous centres by means of the afferent spinal nerves, espe-

cially those proper to the uterus, which from their morbid excitation produce the sequent train of phenomena at the base of the brain and in the spinal cord, may be enumerated as importantly entering into the causation. Irritation in any portion of the alimentary canal, particularly in its gastric course, preternatural vascularity in the colon, a diseased state of the liver, of the bladder, and other parts, have been considered as likely to induce the affection. There can be little doubt that a previously confined and irregular state of the bowels and the accumulation of scyballous and acrid matters, will act as powerful predisponents. In the second example the bowels had been irregular a week before parturition; there had been considerable constipation, and at the time of delivery, as reported, there had been diarrhœa. Morbid conditions existing in the nervous centres themselves, as well as from states operating upon the extremities of the incident nerves, might also be mentioned. These convulsions are uræmic or reflex. There can be no doubt that mental discomposure acts importantly in the induction of the convulsive paroxysms. An anxious and depressed state of mind always exerts a deleterious influence upon the body, and renders the nervous system morbidly excitable, and where such obtains to a considerable extent, or has been long continued, it may readily be imagined that such would be apt to induce the results considered. In cases which I have known, there was much mental disquietude. One was the wife of an officer in the army, whose husband died very suddenly about the period of her full time of pregnancy; labour came on, accompanied with very violent convulsions. The two others were unmarried females, and had both, for some time before, been very despondent. It has been stated by obstetricians, that it occurs far more frequently in illegitimate births than in the confinements of married women. The state of the air by some, especially the older physicians, has been deemed an essential element entering into the causation of puerperal convulsions. There can be little doubt that they are more common in summer than in winter, and when the air is surcharged with electricity; yet they are much more dependent upon more potent causes, and may occur at any season of the year, and under every variety of temperature. The first case was in the month of February, and it was a keen frosty night. Ramsbotham says that the affection is most usual when there is thunder in the air,—an assertion highly probable, and in this respect being analogous to what we know with regard to apoplexy, to which disease puerperal convulsions are nearly allied.

It may be regarded as now being the accepted opinion that this affection is always referrible to uræmia or to reflex irritation. M. Cazenau found albumen in the urine of nineteen cases of puerperal eclampsia. In forty-one pregnant women affected with albuminuria M. Blot noticed that convulsions occurred during labour in only seven. In twenty similar examples MM. Devilliers and Regnault observed convulsions in eleven. Trousseau says albuminuria stands

to eclampsia in the same relation as it does to anasarca; and this writer goes on to remark, although the presence of albuminuria during pregnancy must make one dread the occurrence of eclampsia, it must not be forgotten that convulsions in many cases do not occur. This product in the urine has in pregnancy been assigned to compression of the kidneys, of the iliac veins, or the trunk of the vena cava inferior by the uterus; also to stagnation of the venous blood, and the changes which it undergoes during pregnancy. There is no doubt a combination of these causes in varying proportions or degrees often obtains. In several specimens of blood from patients who were in puerperal convulsions which Sir James Simpson sent for analysis to Drs. Chistison and Maclogan, no abnormal products were detected. Puerperal convulsions appear to be proximately caused by distinct and opposite conditions of the vascular system,—viz., an over-distension, and a too great emptiness of the blood-vessels, because we know that the cerebral vessels being overloaded in a patient of plethoric diathesis, by producing pressure on the brain, will give rise to the paroxysms; and also when there is sudden and considerable loss of blood, as in uterine hæmorrhage, because convulsions often precede the fatal issue, and they have been experimentally produced in the lower animals by sudden and copious losses of blood. It is more difficult to account for their occurrence when exsanguination, than when plethora, is regarded as the cause. The manner in which the result is produced may probably be owing to the equilibrium of the circulation being lost by a sudden effusion of the vital fluid, when the walls of the vessels have not sufficiently accommodated themselves to the decreased volume of blood traversing their cavities; hence their propulsive power would become impaired, and thus congestion and pressure ensue. We know that the heart requires an exact volume of blood to be transmitted through its cavities during each systolic and diastolic action, and unless such volume be normal, its action will become altered, and this change of function exerts a commensurate effect throughout the vascular system. When therefore the column of blood is considerably decreased, the organ is not stimulated to its ordinary degree of contractile power, the vis tergo is diminished, the propulsive functions of the larger vessels are also impaired, and congestion at the vascular extremities is thus engendered, whilst the whole system partakes of the debilitated condition, and thus superadds to the first cause.

There are two descriptions of patients, whose conformations are opposed to one another, with whom the disease appears chiefly to prevail—the muscular, short-necked, apoplectic-looking person; and the thin, slender, nervous female, of high excitable temperament and hysterically inclined. The cases now given were of the eclampsial kind, which, according to Burns, occurs in ninety-nine cases out of every hundred. Sauvages defines the genus *Eclampsia asartum vel musculorum plurimorum spasmus clonicus acutus, cum sensuum obscuratione*. It must be granted, that between puerperal con-

vulsions and apoplexy there is a striking similarity, and some consider the two affections identical, but when carefully compared they are not so, neither in their phenomena during the paroxysm, nor in the effects which follow. In their causes they appear nearly allied. Apoplexy differs from this species of convulsions because in that disease there is never such violent agitation of the voluntary muscular system, and because in the one paralysis generally succeeds, whilst in the other it almost never follows. From epilepsy it differs, because puerperal convulsions rapidly succeed one another, while in epilepsy it is not the case. Again, there is no aura epileptica, and they seldom ever return during the remainder of life. On reference to the first case, it is said that immediately preceding the fit, an intense pain in the head was experienced, according to the patient's own words, as if it were opening and shutting. *Scintillæ*, *muscæ volitantes*, or a fit of shivering, are often the premonitory symptoms. Occasionally there is an incoherent rambling of expression, but more generally little if any intimation is given. If the patient should, however, manifest any evidence of their super-vention, as by complaining of a sense of weight in the head, or dizziness, accompanied with spasm in any part, we should at once be on our guard. The eclampsia of pregnant and parturient women assumes the form of violent tonic and clonic spasms; there is generally a condition of unconsciousness; the whole body is shaken and affected, and often a state of obtuseness or more absolute stupor supervenes, which continues for uncertain, sometimes protracted periods. There is generally an absolute forgetfulness of all events and surroundings from the seizure to the return of consciousness.

TREATMENT.—The next question that arises is,—are we to deliver, and how? It is the great efforts of the uterus, those powerful actions which are induced in its expulsive essays, which develop the affection, whatever may be its prime origin, and as the fits return with the regularity of the pains, it is obvious that such pains act as excitants, and if the uterine contents were expelled, and the efforts of the organ to cease, the cessation of the pains would tend to avert or defer the convulsive paroxysms. A pain comes on, the expiratory muscles for some time remain in a continuous fixity, the glottideal fissure becomes closed, the blood imperfectly aerated is sent with increased force and quantity to the brain, the vessels proper to that organ become distended, and pressure and the convulsive paroxysms in consecutive order succeed. But when the uterus is emptied of its contents, and thus its expulsive efforts almost or entirely abated, it seems conclusive that the convulsions will not be so likely to return in such quick succession. The delivery I am aware frequently does not cut short the paroxysms, nor prevent their return, and in the instance now presented there were fits after the child was born and the secundines got away; but what is now contended for is, that during their continuance they may be less severe, and their succession not so frequent. Again, the child is, in the

majority of instances, dead, another reason in favour of emptying the womb. The manner in which the delivery should be accomplished, entirely depends upon existent circumstances. If the head should be so far descended as to be within the reach of the short forceps, this is our best and most expeditious mode of procedure; if it should be above the brim, the long forceps may be tried, and if these modes are unavailable, we must turn and deliver according to the ordinary method. Malformations of the pelvis might of course demand the operation of craniotomy. In the first case the membranes were entire, and the os so far dilated, that with care the hand could be readily admitted. Placing the patient on her left side, the hand was introduced, and the feet easily brought down. Sometimes it happens that the os is not sufficiently dilated; we may in such cases artificially distend. Although this woman was delivered as quickly as possible, the child was dead.

It is a point contested by physiologists as to the manner in which the death of the fœtus takes place, whether it be by the iniquated state of the maternal blood, the venoid and impure condition of which is evinced by the facial lividity during and subsequent to the paroxysms, or whether it be destroyed by the operation of similar radical causes to those which obtain in the mother. It is highly probable that the shock which must necessarily be given to the fetal nervous system would exert upon it a powerful, if not mortal, impression, whilst a degree of obstruction given to the circulation and a vitiated state of the blood, seem at once sufficient to account for its destruction. The child of this person, on being born, was extremely livid, presenting evident marks of obstructed circulation.

To properly unload the bowels is of essential importance, and this can best and most readily be done, as regards the colon, by means of a large injection. In the first case an ounce of turpentine was added to a quart of starch gruel, and this was followed by very good effects. The bowels were reported to have been pretty well moved but a few hours before, yet it seemed desirable to administer the enema in order to thoroughly clear out the larger bowel; and on reference it is said that a considerable quantity of fœculent matter was discharged. A dose of calomel was given to act upon the liver, and superior portions of the canal. When the bowels are obstinately constipated, a drop of the croton oil, in a drachm or two of castor oil, will be found very efficient, and fully to answer the purpose intended. Some writers have, perhaps, laid more stress upon the employment of cathartics than appears desirable, because when considerable irritation is thus induced along the digestive mucous surface, such might be liable to act as an excitant to the paroxysms. Cold applications to the head should sedulously be used; bladders of ice or spring water are, perhaps, the best. There being a fall of snow on the ground when the first case occurred, it was ordered that a quantity should be constantly applied to the head, and there

is little doubt that, as an auxiliary, it was of much utility. In those instances where there is considerable cerebral vascularity, in connection with hot skin, and quick pulse, pouring a stream of cold water over the scalp is followed by very beneficial effects.

Counter-irritation along the course of the spine and to the extremities was adopted, and with apparent success. There is no plan more suitable or efficacious to produce this than the common mustard plasters; they may be made entirely of mustard and hot vinegar, when they act readily and efficiently. The strong liquor of ammonia is available for the same purpose, but on the whole, the former are preferable. These may be followed by blisters to keep up the action if the case should be persistent. Medicines to act on the skin and kidneys were prescribed, and these were the solution of the acetate of ammonia, and the spirits of nitrous ether. Tonics were given during convalescence.

Puerperal convulsions, then, may be regarded as dependent upon irritation in the great nervous centres, and such may exist primarily in these themselves, or be communicated by the afferent nervous filaments, the latter being more frequently the case than the former. And such morbid impressions are intimately connected with the pregnant condition of the uterus; and the expulsive efforts of this organ cause the morbid actions of the brain and spinal cord. The disordered state of the bowels, together with mental depression and a præternatural condition of excitability of the nervous system, as above remarked, powerfully predisposes to the affection. Blood iniquination may often be suspected in the underlying pathology, and kidney complication with albuminous urine are common accompaniments. Violent clonic and tonic spasms with the loss of consciousness are the marked characteristics of the affection. In urgent cases all the means in our power should be to aim at the immediate relief of that vascular turgescence of the brain and spinal cord. And the prompt abstraction of blood is in some sudden, grave, and urgent cases the speediest, safest, and most effectual mode of procedure.

COMMENT.—In briefly commenting on the custom of bloodletting as it was practised many years ago, it is now becoming more acknowledged that the pendulum has swung into the opposite and most extreme direction. An obvious, common, and widespread abuse had become prevalent in the employment of a means which had the warrant of usage from the remotest time of human records, when the art of healing was first proclaimed on the plains of Egypt, and when we are told that man took the idea from observations made on the lower animals, some of which when ill by a spontaneous laceration emitted blood; a means ordinarily adopted by the medical philosophers, over the many centuries, of Greece and Rome, which Galen and Hippocrates commended; and a means which in every age, up to the time in which we live, has been had recourse to by all mankind in the cure of disease. Again, the plan was suggested

by spontaneous events from time to time taking place in the body itself. In epistaxis, hæmoptysis, hæmatemesis, in bloody flux, and in hæmorrhoids it was obvious that the system, by the only natural and salutary manner, was promptly relieved, and thus organs and parts and tissues were better enabled to perform their functions. They have to be regarded as nature's bloodlettings, and man in practice learnt to anticipate the efforts and to assist nature. It is difficult to imagine that this custom, so hoar with usage, and so universally believed in and trusted in, is at once to be fully and finally discarded as an error, a delusion, and an evil. The extravagance and abuse of its practice demanded a check and a reform; there came no wise, temperate, and moderate reform, but a violent denunciatory abolition, admitting of no moderation and no compromise. The good and the bad have been swept away together, and in the consideration prejudice and bigotry have usurped the place of reason. Nor are these psychological vagaries confined to physic; we see the same inconsistencies pertaining to religion, to politics, and a thousand other things, where passions and impulses in the desire for novelty and change seek truth in opposites and extremes. The change of type theory so-called has been the main cause of the aberration on this particular subject, a notion which is at the best but a theory, and which is, perhaps, chiefly referrible to a more precise and profounder pathological knowledge than to any telluric, cosmic, or atmospheric condition. There is no real, demonstrative proof as to whether the entire population have or have not undergone, from inscrutable agencies, or but-guessed-at occult operation, some mutation as to the lessened power of repelling or the altered degree of the receptivity of disease. It is quite true it is the fashion to say so, on the part of the great majority, but there are others who doubt the proposition.

In the times of excessive depletion not a little of the evil produced was due to starvation as well as to bleeding. In France the absurdity was carried to an extreme, to fatal practice. And it was mainly through that false and perilous notion of disease being an entity, a thing apart and defined as it were, to be combated, subdued, and expelled. It was insufficiently taken into account that the circulation had to be repaired and restored, and if the *pabulum vite* is not supplied, such cannot take place. The unreason of such as Chomel and his school can never obtain again. No attempt is now about to be made to advocate the use of venesection in any sort of way after the manner in which it was practised, for such will never again obtain. I propose only to speak of it in its indicated, moderate, and rational availment. And the inherent tendency of certain modes of action in the organism which are termed diseased phenomena, are in reality reparative, and our aim should be to check and bring within the subordination of the economy, as it were, the excessive and unconstrained efforts at reparation. And these excesses spontaneously instituted in the

body may be such as to interrupt the functions of parts, or in vital organs to end in death. These processes of repair are so analogous to growth, that pathologists long ago named the phenomena of inflammation as mere abnormal nutrition localized in some particular part or parts. There is no doubt but red, plethoric, and robust patients with an active circulation, large, hard, and bounding pulse may die from those preternatural and excessive energies, summoned up for reparation, which in truth might be regarded as the uncontrolled fragrance of conservation. And in precisely such cases, where it is an object to retard and diminish inordinate vitalism, venesection is a treatment based upon right reasoning and the warrant of science, as well as the authority of the most ancient usage. A small loss of the vital fluid is made for a greater gain; to re-establish the circulation when there is its arrestment by congestion, to give repose to a preternaturally excited system, and to allow the more rapid absorption of newer and better materials into the circulation, are veritable gains which far preponderate over the supposed sacrifice made of a certain amount of blood. In inflammation the abstraction of blood lessens congestion, and limits exudation. This morbid condition is not merely proliferation or excessive cell-multiplication, but there are also augmented activity in, and preternatural fulness of, the vascular system proper to the parts affected, and, too, that distinguishing characteristic *robur cum calore et dolore*.

The timely, by this term meaning the early, loss of blood beneficially improves the vaso-motor nervous system, and induces salutary changes in the vital fluid whereby the circulation becomes freer and more active in congested parts. The arteries are rendered less constricted, and the blood thinned by a sequential absorption of the more aqueous fluids of the interstices of the tissues. It is undeniable, and must doubtless before long be acted upon, that such grave affections as inflammatory congestion of the brain, in pleuritis, peritonitis, and the parenchymatous substance of organs such as the lungs, liver, spleen, and kidneys, are to be treated by judiciously adopted depletion. Trousseau says it is undeniable that bloodletting in aphasia has been followed by happy results. In certain cases of apoplexy, and when there are premonitory symptoms of that event, when we have reason to believe that the cerebral substance is pressed upon and not broken up, still by fluid and not a clot, and when the præcordial impulse is strong and unsubdued for twenty-four hours, it may be right to bleed, and thus lighten this compression of nerve-fibres. The lowering of the heart's contractile efforts sends the blood stream in less force towards the intra-cranial vessels, and there is diminished calibre of the arteries. In inflammation of the serous cavities it is impossible to doubt its efficacy when had recourse to under the observance of the acknowledged indications and in the earlier stages when there is vascular turgor and the kind of phenomena already

described. Mitchell says in twenty-seven cases of puerperal peritonitis, all of which he bled, no less than twenty-three made a speedy and satisfactory recovery. Surely such would favourably compare with any other form of treatment in that complaint. Sir James Paget lately gave it as his opinion that the wave of public conviction is rolling back towards venesection. Wharton Jones earnestly advocates bloodletting in iritis and in acute catarrho-rheumatic ophthalmia. Dr. Bramwell, of Perth, in thirty-two cases of scarlatinal dropsy frequently had recourse to the lancet, and in that number he had only one death, and this he attributed to the fact of the remedy being employed in too advanced a stage. At the same time there were twenty deaths registered in Perth of this disease. Dr. Kirk, of Glasgow, says in six cases of scarlatinal dropsy, in which there were convulsions, he bled, and only lost one. And this authority strongly commends bleeding in acute hyperæmia of the lungs.

It is beyond all doubt or dispute that in certain instances the sudden surcharge and turgor, and distress of the vital organs, to open a vein in the arm is at once to relieve the embarrassed functions, and, it may be, to save life. It is worth much mechanically, as, in pneumonia, to restore the equilibrium of the circulation, to relieve dyspnœa, and in the aphorism of Alison to avert the tendency to death. In the examples above given both did exceedingly well after being bled, and each made a rapid recovery. Indeed, the result, notwithstanding present usage and modern theories, could not have been better. According to the more recent statistics of Tanner on this complaint, and therefore it is presumptive mainly under the treatment of to-day, one in every three dies. But Churchill, who collected two hundred and fifty-four cases when bleeding was far more the fashion, said that only one in every four and a-half died. And this authority, speaking from immense experience, says in the sthenic form of this affection, when the head is hot, the face flushed, and the pulse full, firm, and frequent, as soon as possible after the convulsions the first thing to be done is to take away blood from the arm, or temporal artery, largely and in full stream. An elderly member of our profession, now retired, happened to call to consult me. For many years he was obstetric physician to a large provincial lying-in charity, and in discussing this point of practice with him he told me he felt positively sure that he had saved several lives by large, full, and fearless bleeding in puerperal convulsions. And he stoutly held to this opinion still, despite that which he regarded as the folly and feeble fashion of the day. I have asked the conclusions arrived at by several acute and observant general practitioners as to this practice in puerperal convulsions, and nearly all have been unequivocally in favour of the emission of blood. Mr. Pollard, of Torquay, after the obvious uselessness of chloral and bromides, bled a puerperal young woman, and at once with the best possible result. Dr. Swayne, physician accoucheur to

the Bristol General Hospital, was called in consultation in the instance of a primipara. Convulsions had taken place at the rate of three in an hour, and hydrate of chloral and bromide of potassium had in vain been given in large doses. Bleeding at once produced benefit; the swollen, livid face became pale, the breathing less stertorous, and the pulse soft, instead of being full and throbbing. They recurred only four times during the next ten hours, and the patient did well; and this authority gives it as his opinion that this means of treatment is in the present day too much lost sight of, and declares that bleeding is a very valuable remedy in certain cases of puerperal convulsions. It were easy, if required, to cite numbers of other recently published examples illustrative of the speedy and signal good effects which follow the timely and full use of the lancet in this complaint, nor can it be argued that the lapse of two or three decades has changed the efficacy of a measure so usually and admittedly employed into a baneful mode of procedure. If venture and excess and rashness were then to be condemned and held in fear by those whose practice was unthinking and routine, in these days under such emergencies inefficacy and feebleness are too often to be complained of as the fault.

This strange abandonment of once so common and general a remedy is, as before remarked, mainly to be ascribed to excess and abuse; it is also to be ascribed to the tyranny of authority on the part of those of high name who in such as in other ways can create a fashion; and, too, it may be referred to the more recent acquaintance with other agents which we now possess as being applicable to the treatment of inflammation which were unknown to the past generations. As history repeats itself, so assuredly will this *lost art* again come moderately into practice. The doctrines so forcibly promulgated by Todd, that received such wide acceptance, and that were as prominently set forth declarative of the view that disease was but another name for debility and a lowered vitalism, and that large amounts of alcoholic stimulants were needed, constituted another reason for the discarding of depletion. The position held by that physician, the ability exemplified in his writings, and the kind of patients admitted under his care in a large metropolitan hospital, gave to many, and especially to numbers who are willing to resign the lead of thought to the few, a concurrence in his opinions, and the fashion, like other fashions, gradually became more and more observed. A more accurately studied pathology, the results of microscopic investigation, and the juster and profounder conception of the phenomena of local lesions, as above mentioned, were not duly estimated as influencing this change. The discovery of the functions of the vaso-motor centre and the vaso-motor nerves had then not shed its light on the intricacy of morbid processes. Blood pressure, and vascular tension, and the reduction of temperature by perspiration as evidenced by the thermometer were not so well understood. We now are aware that a single bloodletting will reduce the tem-

perature of the entire body by two or three degrees, and in the robust, the vascular, and plethoric such effect might prove of the greatest benefit. When judiciously had recourse to in properly elected cases, the emunctories become freer for action, and secretions are promoted, while purgatives, diuretics, and diaphoretics respond more readily. Gross, in his advocacy for a return to rational and rightly selected venesection, says it prevents morbid action from running riot, and repairs strength when the time arrives by making blood with nutritious food and drink, and thus speedily sets the machinery of life again into action. It is incontestable that in a past generation, when there was the erroneous notion that inflammatory disease, including fevers and the pyrexiaë, all indicated an increase of vital action going on in the system, that this usage of the withdrawal of blood was carried into practice recklessly, harmfully, and in the most unreasoning manner. Often, however, this Sangrado custom gave ocular evidence and the most unequivocal proofs of its speedy and salutary effects. In pulmonary congestion, in bronchitis, in heart-disease, in epilepsy and apoplexy, when the features were livid and gorged, the respiration oppressed, and the pulse and carotids indicated surcharged right cardinal cavities, the flow of blood brought momentary relief, as evidenced by a more natural facial aspect, easier breathing, fuller and slower and better pulse. And if the cerebral substance were pressed upon by over-distended vessels, the lessening of the volume of the vital fluid in the circulation often swiftly restored the stertorous and insensible patient to consciousness. Their deductions were correct and unanswerable. In such cases let the dispassionate practitioner, who can divest his mind of the influence of modern fashion of the non-use of the lancet, ask himself if he would rather put trust in brandy? As before expressed, the error now is in the opposite extreme. In more recent years men of ample observation must have noticed the loose, irregular, excessive, and culpable way in which stimulants have been employed. At one time stimulation was carried beyond all the bounds of caution and reason. The profession has already seen the error and veritable mischief of such infatuation, and the more thinking amongst its ranks are returning, in modified degree, to the treatment which has been so long and improperly neglected.

XXXVIII.

ENLARGEMENT OF THE SPLEEN IN LEUCOCYTHÆMIA.

IN leucocythæmia, or leukæmia, as variously named, that affection which comes on independently of the malarial influence, which is caused by some abnormality in nutrition, and distinguished by the presence of an excess of white corpuscles in the blood, this gland is almost always found in a greater or less state of lesion, as the rule, in very extensive and marked manner. In leucocythæmia Hughes Bennett says: "The spleen, in the great majority of cases, has been enlarged, varying in weight from one to above nine pounds. The texture of the organ varied in different cases—in some being of unusual density, in others it was natural, and in a third class it was more or less pulpy. In a few cases it contained yellowish matter, apparently a form of deposit, but in reality degenerated tissue. In most cases the cell and nuclear elements of the pulp were increased in amount, while the fibrous portion of the organ was apparently normal." In an excellent account of this affection by the late Dr. Milner Barry the splenic dulness extended down to an inch of the symphysis pubis, and dissection exhibited the viscus enormously enlarged, measuring in vertical circumference twenty-eight inches, and round its greatest breadth sixteen inches. This physician gave expression to the opinion, which more recent observers have confirmed, that in the splenic lesion of leucocythæmia there is a tendency to exuberance of the splenic tissues. As the rule, there is no inflammation of the capsule, and when there are inflammatory patches on its surface, these are produced by the mechanical pressure, the result of its apposition with, or infringement upon, adjacent organs and structures. Virchow says there are two forms of leucocythæmia, the splenic and lymphatic; that in the first-named the white corpuscles are well-developed cells, and in the latter there are numerous free nuclei and small cells closely resembling the elements of the lymphatic glands. In health, according to Donders and Moleschott, colourless corpuscles of the blood are found in about the proportion of 1 : 373; but in this disease they are so enormously increased as to be in the proportion of 1 : 3. Merbach reports a case in which the proportion of the white to the red was as 244 to 885. As there

can be but little doubt that red-blood globules are first colourless lymph corpuscles and white cells, which have their origin in the spleen, it would seem that there is some vital defect in the secretory process, some abnormality of action in that transformation, however it may be performed and of whatever it may consist, which converts these cells from white to red. At this point our knowledge is bounded, nor can we judge more intimately of that initiatory perversion of assimilative function than we can of that flagrant cell-growth which we know to be the primary and essential condition in the evolution of malignant products. Kelsch in his observations on the pathological anatomy of malarial fevers has made some important observations not only with regard to the numerical variations of the white and red blood corpuscles, but also as pertains to the spleen. He says that during the attack of the fever the leucocytes diminish in greater proportion than the red blood globules, and that the minimum corresponds with the maximum distensions of the spleen. He remarks that the swelling of the spleen and the disappearance of the leucocytes, though parallel facts, are not proportional; the spleen may not be very large, although the numerical disproportion of the corpuscles is very great. This observer's deductions on the blood during the persistence of malarial cachexia with large spleen may here not be inaptly cited. He asserts that the disappearance of the leucocytes was not proportional to the size of the spleen, and he believes the greater or less activity of the vicarious functions of the other blood-forming glands may explain such fact. The induced electric current applied for ten minutes over that part of the spleen which extended below the costal margin always caused a diminution of the splenic dulness to the extent of from one to three fingers' breadth and at the same time a temporary increase of the leucocytes. It would from this experimenter also appear that under the influence of electrification continued for two or three months the spleen gets smaller or the leucocytes increase, and that the red corpuscles increase in number as the spleen is rendered smaller or near to its normal volume. These facts are, in a practical point of view, of great significance, and it would seem that electrification may in many cases be hopefully employed.

No facts have hitherto thrown any light upon the etiology of the affection. Males are said to be more prone to it than females. Again, the specific gravity of white-cell blood is much lower than normal, and there is great excess of uric acid, sometimes three times the quantity found in the healthy secretion. In several analyses which have been made of the vital fluid, excess of fibrine has been discovered. Not only is the spleen augmented in volume, but the entire glandular system is sometimes also found large. Peyer's patches have been seen immensely hypertrophied, and the same condition may be observed in the thyroid, mediastinal, the mesenteric, the cervical, axillary, lumbar, inguinal, and femoral glands. Virchow, however, has noticed the spleen almost of normal volume

when the lymphatic glands were immensely increased in size. Microscopic examination shows the spleen pulp to be simply hypertrophied, the fibrous structures normal, and the pulp cells in very great abundance. Some pathologists have remarked in this affection an infiltrated material in the liver, kidneys, or other parts. Puruloid deposits have been seen in the large blood-vessels; Böttcher saw some small white spots in certain of the viscera, which contained a whitish fluid, and Friedreich describes similar appearances in the pleura and in the lining of the digestive tube. When the spleen becomes thus affected, Bennett believes that hypertrophy of the viscus precedes the morbid multiplication of cell elements. In many examples of leucocythæmic enlargement of the spleen, recent or old hæmorrhagic infarctions have been found in the interior of the gland, and its capsule has been thickened, and the organ adherent to surrounding parts. The embolic blockages which have been discovered have been described as pale wedge-shaped patches, surrounded by a deep zone of congestion. In such instances pulmonary, hepatic, or renal infarctions may be the accompaniment. Reincke discovered hæmorrhages into the layers of the retina; Eberth witnessed an inspection when the pleura and pericardium were much ecchymosed; Wood found hyperplasia of the medullary cells; Mosler met with wasting and paralysis of the legs; and Béhier detected black pigmentation of the intestinal villi, and tumefaction of the intestinal glands. Sometimes this organ may be very greatly enlarged when the other generally accepted leucocythæmic conditions are not present. Dr. Pye Smith, at Guy's Hospital, examined the body of a drunkard who had cirrhotic liver and granular kidneys, and whose spleen was perfectly smooth, and which weighed eighty-three ounces. It was uniformly enlarged, the Malpighian bodies had undergone hypertrophy, and the blood under microscopic examination showed no excess of white elements. In this case the cause of this morbid change might probably be referred to the vascular obstruction in the liver, as there was fibrinous increase throughout the canals.

Infants and children are subject to this kind of splenic enlargement. West has known it to occur at the age of three months, and Politzinsky says the splenic form of leucocythæmia is observed in children only a year old. According to the first-named authority, the little patient exhibits a peculiar pallid, waxen hue, with loss of flesh and strength. When there is no evidence of tuberculosis, the liver usually participates in these changes, and in such case the splenic tumour is elongated, after dipping down into the pelvis, and the liver is of more rounded shape, principally occupying the right side, but not descending so low. There is often in these little patients a hæmorrhagic tendency. Politzinsky asserts that the relative proportion of white cells to red corpuscles is less in children than in adults, and he believes that in them pneumonia is the common termination. Gee has pointed out the fact of the frequent great enlargement of the gland in children affected with congenital

syphilis, and he considers the tumefaction of the organ to be a kind of index to the degree of cachexy.

SYMPTOMS AND DIAGNOSIS.—Enlargement of the organ from this morbid condition is more frequently seen in adults than children; it comes on in an insidious manner, and the patient can rarely give any precise date as to the commencement of that weight, aching, and inconvenience which he ultimately experiences. There is a feeling of fulness and heaviness under the left costal edge which extends into the epigastrium. In an example of this ailment which came under my care, the organ could be felt as an easily moved and large substance, the outer border of which almost extended to the mesial line. Occasional attacks of sickness and vomiting, and sometimes diarrhœa, came on. The patient was pallid and sickly-looking, and she was compelled to keep much to the house, as riding and walking increased her internal discomfort. If those rules for observance which have already been given in aiding our judgment relative to hypertrophy be had in remembrance, this morbid change of the gland would readily be decided upon. In addition to manipulative palpation, percussion will assist much in tending to precision. The outlines of the viscus can then be often clearly demarcated, and its morbid dulness be traced up under the costal edge. The patient lies on his left side or somewhat diagonally towards the back. Some movement can mostly be detected by the respiratory act. The tumour differs from a floating or encysted kidney because it is higher up in the abdomen and becomes lost under the diaphragmatic arch. In some cases leucocythæmic spleen half fills the abdominal cavity, when the nature of the ailment is sufficiently obvious. The blood from such a loss of its red corpuscles becomes impoverished, and the facial appearance is that of anæmia and cachexia. Palpitation and impairment of the respiratory functions sometimes in marked manner obtain; the patient complains of breathlessness, which is augmented by exertion. In addition to general debility being a cause of such symptoms, displacement of the diaphragm upwards, and its consequent pressure upon the pulmonary substance, and the bronchi, doubtless, contribute to the promotion of dyspnoea. Such an immense diminution of red-blood globules means a large loss of iron in the circulation, which it is presumptive would tend to perverted function in organs and tissues; and this elementary and morbid alteration in the sanguinary fluid is necessarily the forerunner of more cognizable and apparent lesion. The hæmorrhagic tendency obtains. Epistaxis, hæmatemesis, and loss of blood from the bowels are not uncommon events, and this drainage, by still further lowering vital action, more strongly pronounces the primary morbid processes. Capillary transudation becomes instituted in the great serous cavities, and œdema of the legs and general anasarca follow in the train of sequence. Blood is occasionally effused in the brain when apoplexy comes on, or delirium and stupor close the scene. Or dissolution may be heralded by pneumonia, or

diarrhœa may gradually wear down the strength, or slowly induced exhaustion extinguish life.

TREATMENT.—With regard to the influence of remedies on the progress of this generally fatal malady, there seems amongst the best authorities to be little or no agreement. Tonic and stimulating medicines have found most favour. The various preparations of iron, bark, and bitter infusions, the iodide and chloride of potassium, and the mineral acids have been abundantly tried, but with little benefit either in diminishing the size of the organ, or altering that fundamental change in the system with which this kind of enlargement is associated. The waste from tissue metamorphosis being so striking as it often is, nitrogenous principles of food with cod-liver oil seem to be indicated. The digestive organs should receive careful attention, and those articles of diet ought to be selected which are easy of assimilation. Change of air, by favouring the conditions for the maintenance of the general health, may be rendered available. It is right, however, to add that these cases, with few exceptions, in despite of all endeavours, pass on to a fatal termination.

Professor Botkin, of St. Petersburg, has asserted that splenic enlargements, from various acute and chronic causes, can for a time be diminished, by the induction of the galvanic current through adjacent parts. By the splenic contraction thus caused the liver becomes larger; in other words, the blood is thus transferred from the spleen into the liver and portal system. This experiment being made in leucocythæmia, the white blood-cells in the system were increased. This authority believes that the nutritive disturbances in leucæmia can be explained by the increase of white corpuscles, a doctrine which has also been put forth by Biesiddecki, of Cracow. The first-named author gives it as his opinion that splenic enlargements are harmful, dependent upon the stagnation of blood which accompanies them and on an increased destruction of blood-cells, and that electrification may oppose these two morbid processes.

XXXIX.

SPASMUS GLOTTIDIS.

THE affection about to be described, though rarely ending fatally, is one which often demands prompt diagnosis and the speediest remedial measures. It is frequently by no means easy to correctly interpret its phenomena; and in every respect it is a disease of much pathological and practical interest, and more especially when met with in adults. The following are examples of the last-named description.

A young woman, eighteen years of age, and servant in a private family, was thus attacked. She was of sanguino-phlegmatic temperament. The volume of flesh was normal; the catamenia had recently appeared in regular manner; her health was fairly good; and she was of somewhat chlorotic appearance. She was attacked about six o'clock in the evening, when the breathing became suddenly laborious and oppressed, and each inspiration was performed with a croupy, suffocating sound, so loud that it could be heard at remote parts of the house. Some questions could only be answered in an indistinct whisper. She never had any similar affection. It was reported that she had had damp feet during the greater part of the day, but complained of no indisposition whatever until the setting in of the forenamed symptoms. On fully expanding the thorax some degree of tightness was experienced over the superior and middle thirds of the sternum; the pulse was of good strength and only seventy-six; the countenance showed an expression of anxiety, and obstructed circulation; all the croupy sounds became louder and more spasmodic. On placing the stethoscope over the lateral aspect of the larynx, a loud whistling sound, resembling the forcible passage of air through a contracted aperture, was most distinctly audible. There was no abnormal sound heard at the thorax, with the exception of increased respiratory murmur and a greater loudness at the bifurcation of the bronchi. She passed a tolerably comfortable night, though a good deal disturbed by dreams, and there had been some wandering. On the following morning sudden difficulty of breathing and the feeling of suffocation came on; she tossed about in bed and gasped painfully for breath. The countenance had an asphyxial aspect; the eyes were partially closed, the croupy respiration was more audible than ever, and the arms were firmly placed on each side, thus involuntarily giving a fixity to the muscles of respiration. The finger was quickly

introduced into the throat, and rotated in the fauces, which produced an immediate effort to vomit, after which a long inspiration was obtained, and with momentary relief. In the afternoon another paroxysm came on in as abrupt a manner as before; she tossed about in bed, violently seized hold of those near her as if in the extremity of suffering; the countenance was livid, there was partial insensibility, and she said she was choking. She became quite conscious, and was more comfortable during the remainder of the day. There were two subsequent attacks, after which the croupy, constricted breathing gradually passed off, and after the elapse of a few days she was convalescent. This case was very illustrative of the way in which spasm of the glottis supervenes in excitable and hysterical young women. She was treated with antispasmodics, sedatives, and rubefacients. Some stimulants were given, and she was made warm in bed. A very similar case to this occurred in the wards of the Tunbridge Wells Hospital. A young woman who had been admitted for another complaint became somewhat suddenly ill with what the then house-surgeon regarded as acute laryngitis. I was summoned late in the night and found the patient in great distress, breathing in loud and stridulous manner, and the features were red and congested. I at once recognised the true nature of the complaint, when a like treatment speedily relieved the urgency of the symptoms.

The next illustration was in a youth aged sixteen. He was healthy-looking, fresh-coloured, of clear complexion, tall of his age, fair, and the muscular system was well developed. Some weeks previously he had had three or four attacks of *petit mal* of mild character. He took cold, having been exposed to wet. On the following day he had a sudden and an alarming attack of dyspnoea, the respiration was performed resembling the whooping of a child, he was flushed in the face, and the eyes were bright and glistening; he complained of suffocation and said he should choke. In the evening of the same day a similar paroxysm supervened, and with this attack there were convulsive twitchings of the voluntary muscles. A similar description of treatment was adopted, and in the course of a few days he was convalescent.

REMARKS AND CAUSES.—Spasm of the glottis is much more frequently met with in children than in adults; indeed, in the latter it comes but seldom under our notice. It is most prevalent in the crowded parts of great cities, and in children brought up by hand when peripheral irritation and reflex action are induced by indigestible and improper food. By far the greatest mortality from this affection occurs before the end of the second year. During the year 1866, three hundred children died from this cause, of which one hundred and ninety-five were males and one hundred and five were females. One hundred and sixty-eight were under twelve months old, doubtless owing mainly to the change of food and the irritation of dentition. Until more recent years it was confounded in the young with croup, and treated

upon the general principles acknowledged as necessary in that form of disease. The appearances on dissection showed that the ordinary characteristics of inflammatory action were not present in the larynx, nor were there the concomitant pyrexial symptoms of inflammation during life; hence it very properly became regarded as of purely nervous origin, and subsequent observation and experience have rendered manifest that it is produced by irritation in the great nervous centres. Various are the names which the complaint has received when occurring in children, as bastard croup, asthma of infants, catarrh suffocante, laryngismus stridulus, thymus asthma, and child-crowing, all of which, however, are the various appellations of one disease. When occurring in the very young, the little patients will unexpectedly die in the most sudden manner; and from the occasional fatality by which it is marked, our endeavours for alleviation should never be procrastinated. Those children who are passionate and irritable, and especially such as are of a scrofulous tendency, are most commonly those in whom the disease is observed. It has been known as the prelude to and accompaniment of hydrocephalus, and is often caused by dentition; and the cutting of the teeth and lancing of the gums have been found effectual reliefs. On setting in, the child will all at once have considerable difficulty in breathing; the chest is imperfectly expanded; between each inspiration a peculiar noise is made; the eyes look full and starting, the features livid, and often the voluntary muscles, especially those proper to the hands and feet, are spasmodically contracted, so that the whole system seems under a convulsive influence, whilst the muscles common to the functions of respiration will for some moments continue in a rigid fixity; at length, after a short interval, or, perhaps, a minute, the little sufferer is relieved by a full inspiration, and thus ends the paroxysm. The central irritation of the vagus at the roots, as by limited congestion, exudation of serous fluid, or some change or induration of the cerebral tissue at that part, may constitute a cause. The condition of anæmia and general dyscrasia have thus been instanced as giving rise to exalted sensibility and the tendency to reflex action. In the rachitic state, when the bones of the skull become altered and thinned, central irritation has been known to close the glottideal opening. And helminthoid parasites have by most authors been assigned amongst the excentric sources of its production. There is shortening of the muscles of the glottis all at once, and the vocal cords become tightly stretched. In all cases the adductors of these cords are morbidly acted upon.

DIAGNOSIS.—It differs from croup, because, as observed, it may be, and is generally, present without any accompanying pyrexia or catarrhal complication, and the anti-phlogistic treatment would be more likely to augment than cut short its course; but there are cases not only in children, but adults, where the diagnostic marks are of a mixed and indefinite character, rendering it thus less easy to decide as to the kind of remedial measures. Cheyne and Clark are of opinion

that the brain is the seat of the disease, but like many other affections incident to the nervous system, it is not satisfactorily proved in what the radical pathology really consists. Any irritative action produced at the different nervous extremities, as during the process of dentition, may thus give rise to a morbid state in the cerebro-spinal axis sufficient for its development, and the same applied to other parts has been known to institute the affection. In adults when there has been an attack of cynanche trachealis, when the disease has not fully passed off, and a cough of croupy character remains, and when the nerves of the larynx are still irritable, then cold or other exciting cause may bring on stridulous breathing. Irritation in the neighbouring parts, or in such organs as are known to have a peculiar sympathy with the larynx, as the uterine organs in the female and the generative in males, has been observed to give rise to spasmodic closure of the glottideal fissure. Irritation, it is true, may be considered as an obscure term—a designation devoid of any real or specific meaning; yet, conceding this, it is quite indisputable that it differs essentially from inflammation, as evinced not only by ocular demonstration, but from other positive and negative proofs; the one is certainly at times preceded by, or associated with, the other, yet are they not identical; and until we become more acquainted with the fundamental conditions giving rise to irritation, we must be content with that term, which is as expressive as any other word that might be employed. To prove that irritation can produce spasm of the glottis, it has occurred when dissection has shown tumours pressing upon filaments of the pneumogastric nerve, or the recurrent laryngeals, without any red blood, depositions of lymph, or other traces of inflammation in the air-passages.

PATHOLOGY.—Sometimes in acknowledged instances of croup we are surprised at the sudden manner in which the child is carried off, and on inspection the new membrane, from its not entirely obstructing the ingress and egress of the air, does not satisfactorily account for the fatal termination; and the same might be said of acute laryngitis. In such instances there are good reasons for believing that the inflammation, by its irritative properties, produces spasmodic closure of the fissure, and thus the sudden termination in death may at once be accounted for. Two instances occurred which are now remembered as illustrative of this statement, particularly one in the case of a stout and robust man, who had been induced by some of his credulous neighbours to take gin and pepper for a hoarseness, which had supervened on a common cold. On his first admission he came into the hospital in the middle of the night, breathing with the greatest difficulty, and each inspiration being performed with a loud whistling noise. The warm bath and other expedients were had recourse to, and in the course of two or three days he was dismissed the establishment. On the night of the day of his departure, the spasm of the throat suddenly returned, and he again sought entrance into

the wards, which he but a few hours previously had left. The same line of treatment was employed, but not with like success. The breathing continued difficult; there was engorgement of the countenance and alarming attacks of dyspnœa, rendering the operation of tracheotomy desirable, after which expedient he survived not more than twenty-four hours. On dissection, lymph was found in the trachea, but very little in the larynx; the bronchi were red, and their membranous lining a good deal injected. The inspection unequivocally demonstrated that the inflammatory action in the trachea had given rise to irritation, which produced spasmodic closure of the glottideal fissure. Another instance of a woman I well recollect on whom tracheotomy was performed, which ended fatally, and whose body I examined. It was anticipated there would be the results of inflammation in the larynx, which organ I carefully laid open, and minutely examined, but could not discover a particle of lymph. If tumours, pressing upon filaments of the par vagum, or irritation in remoter parts of the nervous system, can give rise to spasm in the larynx, we can much more readily imagine inflammation in the trachea, or in the larynx itself, instituting spasm in this organ; and the pathological illustrations just cited are quite in accordance, or certainly not inconsistent, with rational theoretical inferences. It has repeatedly been noticed that disease of the epiglottis, pharynx, and œsophagus, has given rise to it; and Morgagni and other of the older authors instance bronchocele, aneurism of the aorta, and arteria innominata, in its etiology. In adults suppurative collections in the vicinity of the trachea and larynx by pressing upon the superior or inferior recurrent nerves may be accompanied by stridor, and occasionally in grave and frequently returning manner. With respect to its occurrence in children, Wichmann and Schmalz, as observed by Joy, have taken peculiar pains to point out the distinctions which exist between this disease and croup. The latter seems usually to depend on cold damp air, and sudden atmospheric vicissitudes; its inflammatory nature is manifested as well in the character of its symptoms, as by the beneficial effects of antiphlogistic treatment, and the appearances on dissection. Spasm of the glottis, on the contrary, is excited by passions of the mind and other sources of momentary irritation existing often in distant parts of the body; catarrhal symptoms form no essential part of the disease; it occurs chiefly in those who have a general disposition to convulsive affections; its attacks are intermittent, and are most susceptible of relief from agents acting on the nervous system; and it presents after death no traces of inflammation of the respiratory organs. These observations relative to the disease in children have been offered because in them it has been more thoroughly investigated than in grown-up people, because, as previously remarked, it is by far most frequently met with in the former, and thus there have been more extended opportunities for observation and general deductions.

Spasm of the glottis in the upgrown is most common in females,

and especially in hysterical young women. It occurs chiefly in children, but in some rare instances it has been observed in adults also, chiefly in nervous women and old persons. In nine cases out of ten, when becoming developed in females, there is great mobility of the nervous system, and some disorder of the uterus or its appendages. It comes on paroxysmally, and presents sometimes accompanying features of the epileptic character. Cold, sudden emotions of the mind, obstructed catamenia, feelings which relate to the sexual functions, and similar excitants, may operate as proximate causes to its development. In such instances, percussion along the spinal processes will occasionally, in the lumbar or dorsal regions, be followed by tenderness, and upon inquiry, the patient will often be found subject to neuralgic pains in the different parts of the body, as under the left mamma or left ribs, at the epigastrium, hypogastrium, and other parts. She will also void large quantities of limpid urine, whilst the alvine evacuations are scanty and irregular. In males it is perhaps more frequently the result of irritation near to the larynx, than from distant impressions upon the nervous system. When it does occur without any obvious irritating cause in or near the throat, there are great reasons for believing that delicate hysterically inclined young men, or boys at puberty, would be the most likely to have this curious, and to that sex uncommon, disorder.

When the glottideal fissure becomes spasmodically closed, the patient then of course suffers from all the evils of, or dies from, asphyxia; the countenance becomes turgid and livid, the eyes prominent, and the whole frame convulsively affected. The preternatural vascularity in the encephaloid mass, the great congestion in the lungs, together with the venoid condition of the blood, owing to imperfect aëration, readily impair the sensorial functions, and a state of unconsciousness at once supervenes, indicating the danger then present. The venous engorgement in the brain might be so considerable as to produce rupture of its vessels and consequent sanguineous effusion, after which the case might of course assume the ordinary characters of common apoplexy. The sense of constriction in the chest undoubtedly arises from pulmonary engorgement, as well as from the spasmodic fixity of the muscles proper to the function of respiration.

Lay, speaking of it as confined to infants, makes some interesting remarks on the fundamental causes. He conceives it to be of cerebral origin, as from some diseased or disordered state of the encephalon, or from irritation applied to filaments of the eighth pair, which may be produced by enlarged glands in the neck, pressing upon the recurrenents, or some part of the pneumogastric, and thus closing the glottis by subverting the exact antagonism by which the glottis is automatically and involuntarily kept open, and allowing its margins to come together, and to occasion the peculiar kind of inspiration so much like that of croup. Again, he remarks in substantiation of the opinion that glandular enlargement is the cause of this affection

in children, and he says scarcely an instance has occurred since his attention had been directed to the subject in which there had not been the strongest foundation for the belief that either the glandulæ concatenatæ of the neck, or the thoracic absorbent glands, had become morbidly enlarged. It has been abundantly shown that pressure upon any of the chief branches of the par vagum might close the chink of the glottis, especially upon the laryngeals. Irritation of the gastric ramifications might even close the fissure, and the attacks in children are very common after a full meal. It has also been said that an irritating cause, located in the branches of the trifacial, would have the same effect; this, however, is more problematical than what is advanced with regard to the par vagum. The functions of reflex action are quite applicable and elucidatory in unravelling the special pathology of this affection. From what has been said it seems conclusive that morbid impressions conveyed to the great nervous centres, or existing in these themselves, will give rise to a spasmodic condition of the glottis in the young. Hence, reasoning from these facts, and knowing that the functions of the cerebro-spinal system are inextricably blended, it may readily be imagined how irritation in one part of the spinal marrow might be transmitted to nerves given off at another, and more especially when it is recollected that between the organs of generation and the larynx there is an intimate though unintelligible sympathy; therefore, in the instance of the above cases, particularly in that of the female, it is highly probable that the *prima causa* was located in the generative organs; in the boy, perhaps, this conclusion might not be quite so obvious.

On a perusal of the first of these cases, it is seen that the patient was a young and chlorotic-looking girl. The affection, as in children, came on with great suddenness. There was a degree of attendant spasm in the muscles proper to the chest, as evinced by the sensation of constriction experienced when full inspiration was attempted. The stethoscope at once proved that the disease was not in the chest, but in the larynx, notwithstanding the sense of pain in the chest, and this was the partial closure of the glottideal chink. On the night of the attack she had no return, nor on the morning following were there any pyrexial symptoms indicative of the existence of inflammatory action. The paroxysms which subsequently came on during that day were in a moment, and during their continuance, as seen from the reports, there were hysterio-epileptical symptoms, in addition to those immediately produced by the asphyxial condition under which she laboured. It has been said that damp and cold have little to do with the production of laryngismus stridulus, and that croup, on the contrary, is mainly brought on by these conditions. It is quite clear from the above cases that the first of these statements is incorrect, as in both instances wet and cold were the exciting causes. The young woman had been employed most of the day on which her illness commenced in pumping and carrying water out of the house,

which had come in during a great flood of an adjacent stream, and her feet had been wet for some hours. The boy stated that the day before his attack he was thoroughly wet, and on the following morning he had in a great measure lost his voice. The instance of the youth supplies a good example of one of those cases, but rarely observed, of distinct hysterical symptoms in the male. When such become manifest in this sex, it is about puberty, when the generative organs, and the body generally, undergo a great change, or in the persons of nervous and excitable young men, though cases have been recorded of distinct hysteria occurring in a stout plethoric man. Sydenham, Hoffman, Whytt, Ferriar, Viller-may, Georget, Conolly, and others, favour the opinion that undisputed hysteria may occur in the male; when in this sex it is never, however, so unequivocally developed as in females, perhaps owing to the greater mobility which there is in the latter than the former. The writer knew a married gentleman, of two or three-and-thirty years of age, who at times was decidedly hysterical, being often somewhat melancholic, highly irritable, had the globus hystericus, rendering no doubt whatever as to the nature of the affection. The paroxysms in the boy presented much the same kind of symptoms as the girl, hysterical and other feelings. There were slight lachrymation, a sensation of choking, a wild incoherent tossing, with great difficulty of breathing, and a congested state of the countenance, which demonstrated asphyxial symptoms. The hands were suddenly clinched, and the inferior extremities involuntarily moved in convulsive twitches, and he intimated that he felt a painful tightness at the chest and throat. From these facts, then, it would be difficult to dispel the opinion of there being evidence of true hysteria present, with whatever other conditions associated.

TREATMENT.—Respecting the treatment of the two cases, it is quite undeniable that medicines which produce a ready sedative and antispasmodic effect upon the nervous system constitute the class of remedies most correctly indicated. Our object is to overcome the morbid irritability which there is in the nervous centres, and when the paroxysmal attacks have subsided, to strengthen the system by means of tonics, of which the mineral kind are the best, especially the preparations of iron. The antispasmodics employed in both cases were of essential service. The strong liquor of ammonia applied to the throat was exceedingly useful, and tended to cut short the paroxysm. The inhalation of the vapour of hot water, impregnated with laudanum, proved very advantageous, and as an adjunct should never be omitted. During one of the paroxysms of the young woman, as recorded, the finger was freely rotated in the fauces, which produced an effort to vomit; she then obtained a full inspiration. On the whole, it is evident that these cases should be treated on general antispasmodic principles.

In conclusion, from the cases which I have seen of this peculiar

affection, the following deductions seem important to be remembered. In the young, it may be detected from croup by the suddenness of its supervention, occurring in a dry and warm atmosphere, where perhaps no cases of croup are to be observed; by the intermissions of natural breathing; by its taking place at the time of teething, or where there is some obvious source of nervous irritation; by the entire absence of pyrexia; and by the non-existence of the traces of inflammatory action after death. In adults, it comes on as quickly as in children, occurs generally in the persons of hysterical females, is diagnosed from laryngitis by the absence of fever during life and of lymph on the parts after death, and by its sudden mode of accession, by the great utility of an antispasmodic, and the inoperative effects of an antiphlogistic, mode of treatment. In the paroxysms it can be distinguished from epilepsy by the absence of foaming at the mouth and biting the tongue, and by the intellectual faculties remaining entire, together with the positive symptoms before described. Lastly, on application of the stethoscope to the lateral aspects of the larynx, a loud whistling noise is heard, as if produced by blowing through a small pipe, or when a stream of air forcibly passes through a narrow aperture; hence by these positive signs, and negatively by the absence of bronchial murmur in the thorax, it is broadly distinguished from bronchitis, the only other affection with which it might be confounded.

XL.

CROUP.

CROUP is one of those intractable diseases which often bid defiance to the best and most active treatment; and in those instances of its occurrence painful it frequently is to see the little sufferer progressively becoming worse, in despite of the most careful watching, and the sedulous employment of means which the experience and conclusions of the most eminent authorities have recommended. The mortality, from large numerical averages, is not less than one half of the number attacked. One of the most important means whereby the science of medicine has made such signal advancement has been mainly owing to the greater consideration which is bestowed upon diagnosis; and thus it is that the prognosis is pronounced with far more certainty; and that the curative means are now more successful. The position long ago put forth by Cullen, that the practice of medicine is founded on conclusions deduced from reasoning, is undeniable. The more demonstrable and intelligible the fundamental causes are made, the better understood will be the effects. There are various affections of the throat, and some of these, superficially viewed, greatly resemble each other, although in their essential pathology there is a distinct and an important difference; for instance, between croup and laryngismus, during the paroxysmal attacks, there are symptoms very much alike, but which arise from separate pathological conditions. The one depends upon an active and morbid change existent in the throat itself; the other may be, as it often is, a reflection from the lesion of a distant organ or organs. The former is the result of acute inflammatory action; the latter purely confined to the nervous system. Both are dangerous, but one much more so than the other, and each demands a distinct, and even opposite mode of cure. Now, such being the case, nothing can be of greater consequence to the welfare of the patient than a correct diagnosis. There is, however, more especially in children of highly excitable and nervous temperament, at times a blending, as it were, of the diseases, and it is in such instances when extreme care is demanded in the employment of remedies. A careful examination of the parts, so far as can be effected, and a right knowledge of the most prominent symptoms, exemplifies, in the progress of both forms of these maladies, a just estimate of the degree of inflamma-

tion; the amount of spasms, the true temperament, the age, the history, and a consideration of collateral facts, will only lead to truthful deductions. The paroxysms of dyspnœa, ever, to a greater or less extent, observed during the progress of croup, are more dependant upon the irritation produced in the recurrent laryngeal branches which go to supply the muscles of the larynx than from the mechanical obstruction, by effusion of membranous exudation, given to the ingress of air; and in the fatal instances of laryngitis, in the adult, such is generally the manner in which death proximately ensues. I can now call to mind some cases of laryngitis that went on to a mortal termination, and proved, on inspection, not to have been fatal entirely from the quantity of plastic matter thrown out around the glottis, because the fissure was partly patulous, but where it was evident spasmodic contraction must have coexisted. When there is but a moderate quantity of effused matter surrounding the glottid chink, it does not require the superaddition of any considerable excess of spasm to destroy life. There is, then, a co-operation, as it were, of morbid actions, and as the actual excitant (inflammation) to the anormal muscular rigidity is continuous, the spasm is thus likely to be so persistent as to produce death. With regard to nervous children, Rayland says it sometimes assumes a spasmodic form, insomuch as the vascular excitement is comparatively trifling, whilst spasm of the glottis and general convulsions occur frequently during the disease, and the remissions are singularly long and complete.

Pathologists have defined definitely these complaints; and numbers of cases of so-called croup were considered as and treated for such, when they were really of a non-inflammatory laryngismal character. It is not to be supposed, that because a child is taken with a sudden fit of dyspnœa, attended with croupy respiration, and at an age when croup usually prevails, together with being under circumstances deemed favourable to its development, it necessarily follows as being croup; a further state of things should first be determined upon, and the most decisive of these is, whether any traces of inflammation be visible in the throat. In true exudative croup, such can always, to a greater or less extent, be observed. If there should be sudden and unpremonitory supervention of the paroxysm, without any previous sore throat, or symptoms of cynanche trachealis before, it is far most probable that the affection is merely laryngismus, and the patient should be promptly treated for a spasmodic, not an inflammatory disease. I have asserted that the laryngismal affection is often caused by a reflex action in the nervous system, and such we know to be the case, both from pathological inspections and experimental investigations. Disease of the brain itself, as softening, the effusion of serosity, and tumours, will produce it; enlargement of the thyroid gland, mechanical pressure upon the laryngeals by tumours in the neck, will give rise to spasmodic closure of the glottis. Irritation applied to the terminal

filaments of the recurrens causes the same phenomena. It has been stated, as a question, however, whether this closure of the orifice be proximately produced by the anormal contraction of all the muscles proper to the larynx, or from a paralytic condition of the antagonizing set of muscles, whose functions are to keep the glottis open. This question, now incidentally mentioned, is a mere physiological doubt, and reducible to no practical bearing.

Having said that lesion in the encephalic mass is often followed by spasm of the glottis, it is inferrible that sanguineous congestion would, in like manner, as by the exudation of serosity, tumours, etc., cause such pressure and arrestment of its functions as might endanger or destroy life. In epilepsy, vascular obstruction at the base of the brain in this manner produces the asphyxial symptoms that accompany the epileptic paroxysms; and, indeed, in these fits there is a cycle of phenomena operating as cause and effect, by pressure giving rise to spasmodic closure of the glottis, the non-aeration of the blood increasing the vascular obstruction, and still further producing vascular congestion and mechanical irritation in the great nervous centres, which continued, augment in multiple ratio a deleterious effect upon the vital functions; and thus it is, in puerperal and other fits of that nature, that the emission of blood, by relieving the cerebro-spinal organs, is a practice so rational and beneficial. There is an hysterical affection of adult age, which not unfrequently assumes the character of croup. This form of the disease, a non-inflammatory, purely spasmodic form, does at times occur in the adult, and assume symptoms similar to those which are more commonly observed in children. It is by far most frequently seen in the persons of hysterically-inclined females, but it may be observed, though rarely, in excitable, nervous young men, or youths about puberty.

That the essential pathological character of croup is inflammation of the lining membrane of the larynx and trachea, attended by a concrete albuminous exudation, is unanimously admitted by the best pathologists of the day. Without the formation of a false membrane no acute affection in the larynx and trachea can be termed croup. The speedy manner in which the exudative process goes on is the cause of rendering this fearful disease so mortal. When we take into consideration the minute anatomical structure of the lining membrane proper to these organs, the pathological changes are well accounted for. The tonsils are almost wholly made up of follicles, and the lining membrane of the larynx and trachea, though in less degree, are the same. It is around the tonsils and in the larynx that the greatest quantity of the deposition is observed, and the progress of the disease is from above downwards; it never commences in the lower part of the trachea, or in the bronchial tubes, and ascends upwards, as some writers have believed. This fact is of practical consideration, inasmuch as we thus see the reason why topical applications to the throat at the outset of the disease are beneficial, most

especially powerful caustication. The inflammation, of course, spreads by continuity, as it always does with most rapidity in membranous tissues, and by at once applying so effective a remedy, it may readily be imagined that the morbid action would be arrested in its progress, whilst the mere employment of curative means, addressed to the system at large, would be so tardy in the production of their effect as to give time for the exudation to go on, with that celerity so characteristic, as observed, of the inflammation in these organs. Every practical man is aware that acute diseases in young children always pass through their stages more quickly than in adults; indeed, this truth is equally the fact with the lower animals. In infancy there is a far higher amount of vital action; the circulation, secretion, excretion, and powers of assimilation are carried on far more speedily. There must be excess of functional action in the vital organs, in order that renovation shall exceed decay, which is, in other words, growth. Whenever the functions of a certain organ or organs proceed with considerable activity, there disease is liable to occur. It is on this account that children are more prone to acute pneumonic inflammation than adults. There is, perhaps, another reason why the albuminous deposition is so freely thrown out, and that is, on account of a greater degree of albuminous matter contained in the blood of young children, mainly attributable to a greater quantity of carbonaceous matter contained in the ingesta. To these two causes, excess of the circulatory functions, and a great amount of albumen in the blood, together with the minute anatomical construction of the membrane proper to the parts in question, is to be referred the quick formation of that deposition which constitutes a false membrane. The conditions which increase the danger in croup are, the amount of morbid excess in which the circulation is carried on, the presence of a great proportion of albumen in the blood, the length of time which has elapsed since the disease set in, (if long, of course a greater density of the plastic matter), and the degree of cohesion by which it adheres to the mucous membrane. Some morbid anatomists have been of opinion that the submucous cellular tissue, being, as it is generally, distended with serous fluid, is an important change, entering into the causation of the fatal results. Such, however, is a position untenable, because there have been observed many instances of inspection in which the submucous filamentous tissue was but very slightly surcharged with serum, whilst at the same time coexisted considerable firmly adherent exudative deposition, readily accounting, by mechanical and physical obstruction, for the cause of death. Rokitansky, Andral, and Cruveilhier mention the same.

The exudate may be of limited extent, in mere patches, or it may extend over the lining surface of the larynx and trachea, and even to the bronchial tubes. It is generally tough and resistive, and it may be exceedingly thin, or be two or three lines in thickness. Sometimes, when the product has been expelled, a similar deposit

will be thrown out in the course of a few hours. There may be seen, on inspection, a tumid state of the epiglottis, in the sacculus laryngis, and in the ventricles of the larynx. The mucous membrane, in its structure, does not present much of morbid change, and rarely passes into ulceration; it may, however, be red and vascular, and not unusually serum and pus are discovered under it. This false membrane is not like that seen in diphtheria, which is fibrinous, as it is always albuminous, and when examined under the microscope cytoïd corpuscles are most abundantly noticed. In childhood, when the larynx and its orifice are very small, a moderate amount of exudation may produce so much narrowing as to greatly interfere with the passage of the air; hence spasm of the muscles of the organ may readily effect its absolute closure, and thus apnœa follow. After puberty, when the larynx becomes half as large or even as large again, there is less danger in its inflammatory attacks. In those cases which end fatally the non-aeration of the blood may have brought on bronchitis, congestion of the lungs, distension of the cardiac cavities, with a venoid condition of the vital fluid, as in suffocation from other causes. This material thrown out on the air passages is of non-plastic character, as it does not by vascular connection become attached to the surfaces when it is given off, and its ultimate and absolute separation is the invariable sequence, thus differing from those formations which come on in peri- and endo-carditis, and in inflammation of the thoracic and abdominal cavities. The exudation is sometimes sanguinolent; it may be superimposed in distinct layers; it is the thickest at the posterior part of the trachea, and at the bronchi it gradually assumes a pale colour and soft consistence. When death eventuates quickly the false membrane is not condensed and formative, and much of frothy or glairy mucus is effused, and thus the asphyxial symptoms which preceded. At the under surface of the deposit there may be small bloody puncta, or minute extravasations of blood.

With regard to the *symptoms*, they are in the ordinary forms so distinctive and characteristic as to be easy of interpretation even by those who have seen but few examples of the disease. For two or three days the child may not have been well, having had some sore throat, and there will be during this initiatory period some hoarseness, and a hard, dry, harsh cough, which comes on at intervals, and during these paroxysms there is not a little of distress and discomfort. It is feverish, languid, out of spirits and fretful, is thirsty, the skin is harsh, there is a dryness when the hand is passed over it. The child is evidently ailing, and those around it become anxious by this change. The cough is short, sharp, abrupt, and as time goes on becomes sonorous, metallic, brassy, and clanging, as if through a trumpet. It has by the majority of authors been named a *ringing* cough, and the inspiration is markedly crowing. Sneezing and coryza are common;

there is loss of appetite, but no difficulty in the passage of food; the countenance is more or less flushed; the pulse hard and quick, and when old enough the little patient will place its hand on its throat, complain of the uneasiness there felt, and say it has headache. At intervals there may be comparative ease and freedom from discomfort, and such may only be the indications of its coming on during the day. In certain instances it may go to bed fairly well, and the first few hours of sleep may only be varied from health by some restlessness and a certain amount of difficult breathing. Afterwards the worst signs of the complaint may come on with great suddenness; with wheezy, shrill-drawn inspiration, the child will wake up momentarily, with a start, and in alarm, struggling for breath as if it were going to be suffocated, when a flushed and hot appearance of the countenance, prominent-looking eyes, red and injected conjunctiva, proclaim the graveness of the case. It is then obvious that air does not in sufficient quantity pass into the lungs, whilst turgor of the vessels of the head and neck, and the conditions threatening suffocation, mark the advent of impending danger. With the progress of such pathognomonic phenomena, the paroxysms of dyspnoea quickly succeed each other, and at length with little intermission. The non-arterialization of the blood is followed by the ordinary sequences. There is duskiness of the face and superficies of the body; distension of the cardiac cavities by a venoid change in the circulation; and pulmonary congestion with some serous effusion may follow in the train of events. The pulse becomes feeble and irregular, the extremities cold, the feet are apt to turn dark-coloured and hard, the respiration becomes more and more gasping and interrupted, and a long-drawn breath is often the last indication of life. In some cases before the conditions of apnoea are presented death may take place unexpectedly through persistent spasms of the laryngeal muscles, and when an accumulation of mucus has also aided in blocking up the orifices. As the rule, this disease does not extend beyond four or five days, and it often terminates fatally within forty-eight hours.

In briefly speaking of the *diagnosis*, the diseases which most simulate it, and which are chiefly to be borne in mind, are laryngismus and diphtheria. There are other affections of the air-passages which are to be held in remembrance, but with care such can be distinguished from this the most formidable complaint. Digital examination should not be omitted, as the tip of the finger may feel an oedematous and a swollen epiglottis. In all instances in which the laryngoscope can be used it should be rendered available, when redness, thickening, altered conformation, and croupous deposit might be seen, thus conferring certainty as to the nature of the disease. In mere spasm of the larynx its accession is of the convulsive order, and is to be mainly attributed to cerebro-spinal reflex irritation. It is not preceded by cough and fever. It is more sudden in its advent, and often in greater or less degree

similar attacks have preceded. When the seizure has passed off, stridulous breathing does not remain, and the child cries; the intermissions are complete, and often during the attacks the thumbs, fingers, and toes are contracted. It may be caused by tumours, enlarged glands, some obstruction or foreign body in the wind-pipe, and thus irritation in the recurrent nerve. In diphtheria contagion can often be assigned as a cause, or, as I have repeatedly seen, that affection may be traceable to polluted drinking-water; it comes on more gradually; sore or inflamed throat often precedes; the sublingual and sub-maxillary glands are usually implicated, and there is albuminous urine. Again, visual examination can often detect a diphtheritic patch, which at once solves the question. Tracheitis and laryngitis are more commonly seen in adult age, and the usual inflammatory phenomena are more pronounced. In bronchitis the stethoscope and other thoracic indications will be our guide. In *pertussis*, the long continued whoop, the convulsive paroxysms, the absence of fever; the discharge of a clear, tenacious, glairy fluid; the unchanged voice; and the easy and normal respiration during the intermissions, are sufficient to give positiveness in judging between the two affections. Sometimes the inadvertent drinking of boiling water, taking certain chemical fluids, or the inspiration of irritant gases, may be followed by inflammation of the throat and larynx; but such causes throw a right interpretation on the morbid signs. When, as is often the case, a piece of albuminous croupous membrane is expelled, the true disease is at once comprehended. In measles, scarlet fever, and small-pox croupy symptoms may come on as an intercurrent complication, but they are then less severe. Œdema of the larynx may supervene in progress of certain diseases, but in such instances the marked and peculiar characteristics of true membranous croup are not present.

In the mention of *prognosis*, it may be with confidence and concisely said that it is the most fatal of all maladies incident to infancy and childhood. Our hope lies in early, active, and well-directed treatment. The younger the little patient may be the greater is the danger; and, as it has been commonly observed, there is less chance of recovery when it occurs in infants than when it is met with in more advanced childhood.

With regard to *treatment* no time should be lost in bringing to bear those recognised and effective remedies which experience has shown to be followed by the greatest success. It is of utter importance that certain matters should be attended to at once by the practitioner, in order that the surroundings of the little patient should be such as to lessen that irritation which tends to usher in the disease and aggravate the symptoms. The child should immediately be put into a warm bed, the chest and throat being covered with flannel; and a tent should be erected over the bed, so that it should not inspire the colder air. The temperature of the room should be carefully kept up from 65° to 70°. A kettle of water should be con-

tinued boiling over the fire, and a long spout attached to its pipe in order that the heated steam could be diffused through the apartment. A temporary spout could be made of paper, and from time to time the steam should be conducted within the tent, and thus the air immediately breathed would be warm and moist. A hot bath should be given not lower than 98°, and the little patient be kept in it not less than ten minutes. When taken out it should be speedily wrapped in a flannel, again put into bed, and flannels or sponges wrung out in water as hot as can be borne should be applied to the neck and throat. In those who are of an age capable of complying with the request the inhalation of steam is generally followed with great benefit. It may, perhaps, be said that the most valued medicine in this complaint is the tartarized antimony. To excite the occasional acts of vomiting is most desirable. One grain should be dissolved in an ounce of boiling water, and when cold a tea or dessert spoonful should be given every ten or fifteen minutes until the desired effect be produced. In infants the ipecacuan wine may be sufficient to bring on the effect before named. In milder cases, and during the declension of the disease, this drug only might be needed; or according to circumstances, the ipecacuan and antimonial wines, mixed in equal quantities, may be given. It sometimes occurs during the act of vomiting that a piece or pieces of the false membrane may be thrown off, which, it need hardly be observed, is a fortunate circumstance, the ingress of air thus being rendered easier. Coughing should be encouraged and not suppressed, to expel, if possible, some of the obstructing and new formation. Local applications should not be omitted. The handle of a dessert or tablespoon should be carefully introduced into the mouth, the tongue drawn forward, and the epiglottis brought into view. A solution of alum or the nitrate of silver, or the tincture of the perchloride of iron, can then be applied by means of a brush or a piece of sponge affixed to some suitable staff; or the parts might be touched with a finely-pointed piece of crystallized or stick caustic, a remedy which in some cases is followed by speedy and marked benefit. A poultice of linseed-meal with a little mustard, put on the neck and throat, aids in conferring relief. The bowels should be freely acted upon with a full dose of calomel, and subsequently kept open by means of salines. Diaphoretics are of service in rendering the skin moist and active. Enemata from time to time may be administered, and more especially if the stomach be irritable. Concentrated and easily digested articles of food, suited to the age of the patient, ought to be given at short intervals, and nutritive enemata are in some instances much to be commended. Children hardly require stimulants. When these seem indicated a little wine and water may be had recourse to in order to sustain the pulse. If the attack should put on severe and grave symptoms, as indicated by a venoid facial tint, vascular fulness about the head and neck, and there be the stethoscopic indication of the commencement of pulmonary congestion, leeches may be ordered

to the upper part of the sternum ; and the loss of blood should be regulated with a due reference to its effects, and especially with well-watched care as to the condition of the pulse. Lastly, when the fear of apnœa becomes entertained, tracheotomy should be performed without hesitation and without delay.

XLI.

CHRONIC GLOSSITIS

THE above-named is one of those rare forms of disease which are so uncommon as to constitute mere exceptions in the long catalogue of ailments with which the physician has to deal, and of which those of the largest experience, even during a lifetime, observe but few examples. I do not mean those partial and superficial instances where one or both sides are inflamed, without the voice or taste being interfered with, or without the functions of respiration and deglutition being affected, as such are common enough, and are generally referrible to some not very occult cause; but I mean when the major part, or the entire organ, becomes large, tumid, hard, and painful, when neighbouring textures become implicated, and when these morbid conditions are persistent, nor readily amenable to treatment. In all such cases the diagnosis is difficult, for whenever the tongue becomes, without assignable cause, gradually large and indurated, it is expedient to give a guarded prognosis. We know that such a state of this organ is ominous, that it is a frequent forerunner of malignant disease.

The patient, aged fifty-five and married, had six children, and was a tall and powerfully made woman, the wife of a farm-servant, residing at a distance. Stated that until the supervention of this affection she had always enjoyed excellent health. Countenance haggard, dusky, and cachectic. No syphilitic history nor any suspicion of that disease ever having been contracted. In June she began to have pain and a sense of weight and fulness at the epigastrium, which were attributed to indigestion. The appetite began to fail, the general health to be undermined, and she gradually lost flesh. Under these circumstances she was recommended to seek further advice. I first saw her Nov. 10th. She was then emaciated; looked most desponding; spoke thick and imperfectly, as if something were in her mouth; said she had lost two stones of flesh; could swallow nothing but liquids, and dreaded death by starvation. On protrusion of the organ, it was large, as if filling the mouth, pale, dry, convex, smooth, and tense, without fissure or raphé, and appearing as if divested of papillæ, even the V-shaped circumvallate lines being obliterated;

sides and tip not notched, red and irregular as often noticed, and there was a lack of the ordinary secretion in the entire buccal cavity. On taking the organ between my fingers it felt of cartilaginous hardness, and moderate pressure gave lancinating pain, which radiated into the throat and neck. No ulceration nor any marked amount of injection either in the tonsils, isthmus faucium, pharynx, uvula, or other parts. Submaxillary glands larger than normal, and decided tenderness when moderate pressure was applied to the parotids. On a general examination of the patient, no other signs of disease. Reviewing all the facts of the case and the accompanying symptoms, I was most inclined to coincide with the opinion which had been given—viz., that it was probably malignant. There was, however, the possibility of its being a deposition of lymph, which as an inflammatory product had not been absorbed; and knowing how the iodide of potassium promotes absorption, I ordered that medicine with compound tincture of iodine three times a day, to live on new milk, eggs, cocoa, pounded beef or mutton made into thick soup, farinaceous food, and a moderate allowance of port wine, all of which, she said, would be procured for her, vegetables, cheese, bacon, salt meats, and other indigestible articles being strictly prohibited. She came to see me again in the middle of December; I was then from home, but she left a message saying she was decidedly better. I next saw her January 14th, when at a glance the change in her appearance was most apparent. The tongue was considerably smaller, softer, and the raphé faintly discernible. She could swallow solids, had made flesh, and there was less pain in the tongue and throat. The next time she visited me was March 1st, when she had gained a stone in weight, and in every respect there was still greater improvement. The tongue was almost reduced to its natural size, fissure and the papillæ perceptible, and the organ had lost its preternatural fleshy cleanness, and was covered with a thin creamy coat. When examined between the fingers only a small amount of hardness remained, and the enlargement of the submaxillary and parotid glands had subsided. Medicine continued. I saw her some few months after the last date, when the tongue was quite natural. She had gained two stones of flesh, and was in her wonted good health.

I will now contrast with the foregoing an example of chronic glossitis which, in greater or less degree of severity, is not uncommon, and which in hospital and dispensary practice is often observed.

The case was in a man aged thirty-seven, of nervo-biliary temperament, married, a shoemaker, volume of flesh good, and who to all external appearance was in ordinary health. I first saw him as an out-patient on May 27th. During the previous eighteen months he had been under medical treatment. No disease of any of the organs in the thoracic and abdominal cavities,

with the exception of some tenderness on palpation at the epigastrium, which was full, rounded, and resonant. Had syphilis sixteen years before, but not since. Of temperate habits; and, for a person whose employment was so sedentary, had enjoyed tolerably good health. His complaint was a chronically inflamed tongue. On its protrusion it looked broad, flabby, raw, red, smooth, and shining. No irritation from decayed or roughened teeth. The papillæ were abolished; redness at the tip and edges excessive; sides irregularly notched and knotty, and at these parts, more especially towards its base, small vascular prominences, like injected excrescent growths, were observable. The organ felt soft and flaccid, and the pain described was that of intense soreness, and not sharp, shooting pains. Pharynx, soft pillars of the fauces, and uvula arborescently vascular; mastication accompanied with some dysphagia, and buccal cavity well supplied with normal secretion. Conceiving this to be a case mainly, if not wholly, depending upon gastric irritation, his diet was minutely particularized. New milk, eggs, cocoa, pounded mutton, soft boiled rice, and the various farinaceous foods were allowed, smoking, stimulants, and all indigestible aliments to be rigidly discontinued. He was put on iodide of potassium and the tincture of iodine three times a day, and compound rhubarb pill as occasion might require. Under this treatment he made rapid improvement; the organ became narrower, the papillæ more elevated, the beefy appearance less marked, and the lateral prominences much smaller. When he last presented himself he said his tongue was wonderfully better; and after August 12th he did not think it needful to continue his visits.

When the anatomical structure of the tongue is considered, that it is entirely muscular, and very abundantly supplied with nervous filaments, it is not surprising that it so seldom assumes the phlogistic form of inflammation to which so many other organs and tissues are prone. The best authorities on this subject—such as Frank, Hildebrand, Loeffler, Zeigler, Von Mertens, Louis, Travers, Elliotson, and others—have been able to describe the phenomena on but scanty data. Each of these authors had seen exceedingly few illustrations of the disease, and all remark upon its rarity. In the majority of instances the cause has been assigned to symptomatic disease of the villous coat of the digestive canal, more especially to that of the stomach and duodenum. The more sudden or acute glossitis has been ascribed to the abrupt suppression of the catamenia, hæmorrhoids, and epistaxis. I remember a case which occurred several years ago that was referrible to cold rather than any other cause. In that instance the tumefaction came on in a couple of days, with the usual pyrexial accompaniments of quick pulse, hot skin, diminished excretions, and the general febrile expression. Scheidemantal attributes an attack to cold; and Neligan saw an example in a man of forty

which was induced by wading up to the waist in water when draining a river. Sudden and serious swelling may supervene from a variety of obvious causes, as irritant and acrid poisons, mechanical injuries, and the stings of insects; and such enlargement may be so great and obstructive as not only to compel respiration to be performed by the nostrils, but to absolutely endanger life by suffocation. Under the now discarded but formerly excessive use of mercury, this fearfully tumid state was wont to occur; and in the writings of Slegel and Trincavellius illustrations are given of this, one of the many dire results eventuating from the abuse of that remedy. But its enlargement from this cause partakes more of simple tumefaction than absolute glossitis.

In the various forms of malignant and eruptive fevers an asthenic inflammation of the organ sometimes occurs, when it becomes large, dark, dry, and fissured; and this inflammation, which is of the diffusive type, is by far most generally simultaneous with the inflammation of neighbouring organs, as the tonsils, the pharynx, the parotids. Van Swieten, Reil, and Delamalle long ago described this condition as the complication of grave types of fever. So far as my own experience goes, I would say that it is most frequently seen in typhus and typhoid fevers, and in scarlatina more than in any of the other exanthems. In the asthenic types of cynanche tonsillitis, the basic part will, by contiguity of structure, become inflamed; but its recession is coincident with the decline of the disease in the organs primarily affected. Again, it has been known to become quickly and immensely distended with blood, so as to be rendered large, hard, stiff, and immobile; and such condition Salter has termed *erectile glossitis*. Liston had under his care a patient whose tongue was the seat of a benignant hypertrophy, occasioned by a naevus-like structure which it had assumed. In idiopathic glossitis, it is the thick part of the tongue, its basic third, which is most liable to disease. In several instances only one side has been inflamed. Graves gives an apt example. He was called to see a gentleman who had had febrile symptoms of a week's continuance. The left half of the tongue became painful and tender, and increased in size; and when he first saw it, it was so swollen as to prevent the proper closure of the mouth. The right half was perfectly natural, and the diseased and healthy sides were demarcated by the median line; articulation and deglutition were seriously interfered with, until the local abstraction of blood produced detumescence; and two years subsequently the inflamed side was perceptibly larger. Sometimes, however, the swelling is transverse, occupying the base. Travers saw a case in which the enlargement was rounded and globular, chiefly at the dorsum and towards the base.

In acute glossitis, the symptoms are always ushered in with heat of surface, quickened circulation, often profuse flow of saliva, and generally diminished taste, the latter of which is doubtless produced

by augmented vascularity, because we know that hyperæmia in other organs will, by pressing unduly upon the nervous fibrillæ proper to such organs, prevent the due performance of their motor and sensific functions; there are also turgid features, tumefactions about the throat, and pains beneath the maxilla. The declension of these symptoms is marked by diaphoresis, hypostatic urine, and a lowered circulation. The case to which I have made a passing reference as resulting from cold exhibited this mode of advent and decline. An antiphlogistic and mild alterative treatment was only indicated, and in the course of ten days the disease had disappeared. Ricord has described a chronic furuncular disease, which first increases notably the volume of the tongue, and then, by pressure and absorption, ends in destructive ulceration; and these furuncular nodules consist of the circumscribed interstitial effusion of lymph. The history and concomitant symptoms would guard us in our diagnosis, and in all such instances there will often be at the median line true syphilitic rhagades. In scrofulous persons glossitis has been attended with abscess, and generally the matter forms only at one side. Ebermager and Copland saw this condition as a sequel to its acute form.

I have remarked in the record of the first illustration above given that there were reasons for the supposition of the affection being malignant—because the patient looked cachectic, had lost flesh, the disease had come on gradually, and had long continued, as cancer is generally preceded by slow and insidious symptoms, because the induration was of scirrhus hardness, and there were glandular swelling and lancinating pains. On the other hand, there were negative facts which conferred some doubt as to its carcinomatous character. Cancer mostly commences in a small knotty tumour midway between the raphé and the edge of the anterior third; in an excrescence, often ulcerated, and at the border; in one or more tubercular eminences, which tend to break up into ulceration; lastly, numerical facts attest that males are far more apt to have this disease than females. Dr. Fairlie Clarke asserts that it is not uncommon to meet with circumscribed induration of the substance of the tongue, as the result of simple hyperplasia, unconnected with any of the graver forms of induration. Numerous cases are recorded in which sudden and acute glossitis rendered the organ large, and in certain of these examples chronic enlargement and induration supervened. Cold, continued and eruptive fevers, suppression of the catamenia, traumatic injuries, and irritants, by various authors are given as the primary cause. Some of the writers above quoted maintain that chronic glossitis will, if the induration be not dispersed, have a tendency to degenerate into carcinoma. This doctrine is not, however, by a parity of reasoning tenable, for without the diathetic proclivity I do not believe that the mere deposition of lymph would ever engender malignancy; there must be that accompanying dyscrasia

by which a flagrant cell-growth is fostered. Rokitansky has made the remark, which practical pathologists will confirm, that primary cancerous disease is very rarely seen in any of the muscles of animal life, except the tongue. It is quite true that the muscular tissue is often involved, as, for instance, in the pectoral; but such is only in a *secondary* manner, if in advanced pathology that expression be now allowed. There is a potentiality in the blastema to reproduce cell-structure in contiguous organs. A blastematous exudate impregnated with the molecular germs of this affection is capable of transference by lymphatic absorption, and doubtless also by venous radicles; and, being deposited in a suitable nidus, such germs become developed into a growth of the same specific character as the primary heterologous product by which they were generated, and from which they were carried. Again, we know that transference can be accomplished otherwise than by lymphatic absorption, as by being borne along a mucous membrane in the current of its ordinary secretion. Thus it has been that cancerous germs in carcinoma of the bowel became implanted to germinate in the rectum, the kidney, in the bladder, in the lungs, and in the bronchi. Recurring to the case in question, it is so far practically instructive that appearances very closely resembling scirrhus may present themselves, and yet the disease be benignant, and the effused product capable of absorption. Niemeyer says chronic indurated glossitis may continue for years, and is often mistaken for cancer. I am of opinion that in this instance a bland, non-irritating aliment had very much to do with the successful issue of the case. The upper parts of the primæ viæ were rendered more quiescent and normal in their functions by the arrestment of that irritation which indigestible articles of food had conferred, because the juvenia seemed to prove this, because the patient very distinctly stated that in the course of a few days after being under my treatment the pains in the tongue and throat in a marked manner began to subside, and because I am very doubtful that the iodine could in so brief a space engender this change. That it contributed potently to the absorption of the lymphic deposit, every impartial judgment will allow; but the nourishing, easily assimilated ingesta were, I think, the greater factors in the benefit. With regard to the second example, the strict rules enforced respecting the diet constituted the most essential part of the treatment, as that form of glossitis is entirely dependent upon protracted irritation of the mucous surface of the digestive canal.

XLII.

TÆNIÆ.

CASE I.—A married woman aged fifty-one presented herself as an out-patient at the hospital August 10th for what she supposed was a chronic complaint of the stomach. She complained of pain at the epigastrium, which she described as *gnawing*, and which came on in aggravated degree at irregular intervals. The appetite was capricious; she ate voraciously; and there was no diarrhœa; nor could the symptoms be referred to the more common forms of dyspepsia. There was no dilatation of the pupils; nor had any pieces of worm been voided. The following draught was prescribed:—

R Olei filicis ʒi. ; olei ricini ʒiv. ; mucil. acaciæ ʒi. M. Fiat haustus primo mane capiendus.

Three of these draughts were taken (one every sixth morning) without producing any effect. The patient came again to the infirmary September 29th; and the following was ordered to be taken early in the morning, fasting.

R Olei terebinth. ʒiv. ; olei ricini ʒiv. M. Fiat haustus.

In the course of a few hours afterwards, a worm (*tænia lata*) sixteen feet long was expelled.

CASE II.—A woman aged thirty-two, single, applied at the hospital for disordered stomach. During the previous three months, she had experienced a kind of working in the bowels, had had voracious appetite, was extremely nervous, and often felt twitching abdominal pains. Sickness and anorexia were occasional symptoms. She had not eaten much pork or bacon, nor any uncooked animal food. The mixture of male-fern oil and castor oil was ordered, as in the previous case, to be taken early in the morning. Three hours after taking the medicine, she passed a worm seventeen feet long. The bowels were freely moved five or six times afterwards. The epigastric pain was relieved immediately after the voiding of the parasite. She had taken turpentine and other remedies without any result.

CASE III.—A married woman with four children, a muscular, fresh-coloured, healthy-looking woman, came to the hospital for advice. She complained of pains in the stomach, which extended through to the back, and which were often of a gnawing character. She was nearly always hungry. She had passed no

pieces of worm, to lead her to the conclusion that she had tænia. She had never been in the habit of eating pork. The pupils were normal; and she did not labour under lassitude or nervous irritability.

R Olei filicis ʒi. ; mucil. acaciæ ʒi. ; aquæ ʒx. M. Fiat haustus primo mane sumendus.

She was requested to take one ounce of castor oil three hours after the draught. She took the medicine at 7 a.m., upon an empty stomach, having had no supper. Within an hour, a worm came away, fifteen feet in length. The long-continued pain at the epigastrium at once subsided.

CASE IV.—A fresh-coloured, healthy-looking girl, ten years of age, presented herself as an out-patient. She had suffered from frontal headache, attacks of giddiness, and pain in the stomach, for several weeks. The appetite was irregular and voracious. There was no diarrhœa, nor aching of limbs. She took one drachm of the male-fern oil, as prescribed above, before breakfast, and half an ounce of castor oil three hours after. In the afternoon, she expelled a worm (*tænia solium*) nine feet long. She very rarely ate pork; never ate raw meat.

The more common symptoms of tænia are a feeling of uneasiness and sinking at the stomach. Sometimes acute epigastric pain darts through to the back, and pains extend down into the iliac fossæ; and colicky twitchings come on at irregular intervals, unaccompanied by diarrhœa; but sometimes there is relaxation of the bowels. The patient complains of frequent nausea and anorexia, or of being constantly hungry, and the appetite being voracious. The pains in the stomach generally cease for a time after food is taken. Pains in the limbs, weariness, loss of flesh and strength, nervous excitability, frontal headache, drowsiness, giddiness, borborygmi in females, and flushed face in children, are also not unusual symptoms. In some cases, there are convulsions. Dilated pupils have, in these examples, been spoken of by some physicians; but the condition did not obtain in the above-recorded instances. From a large amount of testimony, it has abundantly been shown that pork used as an article of diet and other ill-cooked and raw meats form the chief means whereby the ova are carried into the system; and there is no doubt that certain morbid conditions of the intestines favour the development of the scolex into a tænia, by giving it a suitable nidus. According to the experience of Louis at La Charité, pain is the invariable symptom; and it is equally the fact that the symptoms generally become intensified in a ratio with the growth of the entozoon. It often happens that the patient does not seek advice until pieces of the parasite have been passed by the bowels, when the cause of his malady becomes at once apparent. Budd says that the existence of the worm can never be positively declared, unless joints have been voided. When the tail-joints attain full development, they come away; and some

authorities believe that the destruction of the animal can with more facility be accomplished when joints have appeared in the evacuations. It is always absolutely requisite that the head should come away. If the head remain, and as the new joints are formed near to the head, the entozoon very soon grows again, and all the symptoms are reproduced. In the bothriocephalus, each segment possesses its own ovary and male organs; hence some notion may be formed of its enormous powers of fertility.

Turpentine, the oil of the male-fern, koussou, and pomegranate are the chief agents used as tænicides. Turpentine should not be given until other remedies have been tried, because it is not effective unless administered in a large dose; and, when thus given, it is apt to produce vomiting and strangury, both of which may follow in distressing degree. Thus it is not a safe anthelmintic, and, for the reasons given, always objectionable. The celebrated Continental nostrum known as Chabert's possesses turpentine as its most active ingredient. The pomegranate has to be taken in large quantity, when it is liable to give rise to nausea; nor is its action by any means certain. Koussou, the most recently discovered agent, is expensive, and sometimes greatly adulterated; and it does not possess any decided superiority over the oil of the male-fern. The last-named drug is old as the days of Dioscorides. Peschier, of Geneva, was one of the earliest to reintroduce it into practice; he gave it in hundreds of cases, with very marked success. Christison gave it in twenty cases, in all of which the worm was expelled by a single dose. Gull used it in fifty cases with signal benefit. Jenner employed it in twenty-four instances, sixteen of which were cured by a single dose. MM. Rayer, Martin-Solon, Debout, and other foreign physicians, attest to its safety and efficacy. I prescribed the same dose to the fourth case which I did for the adults, because it must be held in view, as Jenner observes, that the action of the medicine is on the entozoon, not on the person of the patient; and it needs a certain dose for its destruction. The subsequent treatment should consist of mild aperients and laxatives; the mineral and bitter tonics, such as zinc and iron; and the infusions of calumba, chiretta, and gentian. As rules for general observance, spices and hot seasonings should be taken with the food. Pork, bacon, undercooked and raw animal food, should not be eaten.

XLIII.

INFANTICIDE.

THE instance about to be given occurred many years ago ; but as similar cases occasionally occur, and as the facts commented upon might at any moment be presented, I have not hesitated to insert this article. It is to be feared that infanticide and concealment of birth are more common crimes than is generally supposed ; and therefore rendering those appearances which are noticed after death, and which may conduce to the detection of guilt, familiar to the practitioner is always desirable. The more advanced and perfected is medico-legal knowledge, the greater are the chances of discovering the perpetrators of these deeds, and the more secure becomes human life. Very great advances have latterly been made in medical jurisprudence, and there can hardly be too much care bestowed upon these kinds of investigation.

The post-mortem examination made on the body of a female infant, which had been found forty-eight hours previously in a river.—The external aspect of the body was in various places besmeared with mud, especially about the head and nates ; cutaneous surface on face, neck, thorax, and anterior aspect of superior extremities of a pale livid hue ; and the conformation of the chest was full and rounded. Umbilical cord was torn, its extremity being ragged and unequally divided, of a pearly white colour, and bright and shining, not at all contracted or shrivelled, but soft and flexible to the touch ; indeed, it seemed little, if at all, different from the state in which it is found at birth. At three or four places along the course of its vessels were observable congested-looking spots, of a reddish brown colour ; no indication of any ligature having been employed ; measured eight inches in length ; no discolouration nor evidence of powerful traction having taken place at its abdominal insertion. Nates smeared with an olive-greenish meconium. Hair light brown, and in the usual abundance. Finger nails fully developed, and reached a little beyond the tips of the fingers ; nails on toes also perfectly formed. The white saponaceous matter, so usually seen at the birth of mature children, present on several parts of the body, but mostly on back and nates.

The body, on being washed in tepid water, became of a more distinctly pinkish colour. On the anterior part of the neck a slight

line was observed where the cuticle was excoriated; this line was four and a half inches in length, and in some portions of its course ecchymoses were apparent. On the left side, a little above the clavicle, was a discoloured patch, resembling a bruise; the superjacent cuticle was somewhat abraded; colour of a greenish blue cast, of the size of a sixpence. No other external traces of violence. Weighed five pounds fourteen ounces avoirdupois. Measured from vertex to heel twenty inches. On making a vertical section, and reflecting back the scalp, a good deal of dark fluid blood escaped from the posterior part. Cranial bones not fractured. On removing the calvaria more dark blood oozed away, and the encephalic mass was much congested, the superficial and membranous vessels, as well as those proper to the substance of the organ, being of a turgid appearance. Convolutions normally developed. Dissecting back the skin corresponding with the line previously spoken of, on the anterior part of the neck, extravasation of blood into the subcutaneous cellular tissue was distinctly discernible, and beneath the bruised patch above the clavicle an irregular space, from seven to eight lines in diameter, presented obvious sanguineous extravasation, and at three or four places in this space a small coagulum of blood, from the size of a wheat corn to that of a small pea, was discovered. The anterior surface of the sterno-cleido-mastoideus muscle showed one or two ecchymosed places, which, on a section being made through them, were found to extend into the substance of the muscle. No foreign body, nor anything abnormal, discovered in the mouth, larynx, pharynx, or trachea. Behind the pharynx, between the soft parts and the cervical portion of the vertebral column, some dark coagulated blood was observed. Opening the thorax, the lungs completely filled the chest, and their anterior margins overlapped the greater portion of the pericardium, so that only a triangular portion at the apex was left uncovered. The organs were of a pinkish red colour, but on their posterior inferior parts they acquired a bluish hue; diaphragm less convex than where the lungs were uninflated. Distinct crepitation felt in every portion of their substance, and when thrown, along with the heart and thymus gland attached, into water, the whole mass lightly swam on the surface. Each lung being placed separately in water, was extremely buoyant, and on each being cut into a dozen pieces, they all readily floated; a piece taken from the posterior inferior part of the left lung (where there was congestion), being powerfully squeezed by means of twisting it in the fold of a napkin, and then put into the water, swam as before. The lungs and heart together weighed 1175 grains; lungs alone 813 grains, and heart alone 362 grains. The heart contained some dark blood in the right side; foramen ovale patulous; ductus arteriosus permeable, slightly contracted in central portion, and in it a small quantity of yellowish fibrinous matter was discovered; ductus venosus empty, but unaltered. On exposing the abdominal viscera stomach distended, and felt

elastic to the touch; after placing ligatures around its extremities, it was removed, and on a puncture being made into its parietes, some gas escaped, and the organ became collapsed; on laying it open, about a drachm and a half of viscid, mucilaginous, brownish yellow matter was found; no morbid appearances detectable. Liver natural; intestines not at all distended, either with air or water, but rather contracted; the normal quantity of meconium present. Other organs natural.

When employed at the inquest, it was not without a full consciousness of the serious duty which was then to be discharged, because there was no circumstantial evidence, beyond the mere fact of the discovery of the body, to lead to the supposition that the child had been murdered, and upon the medical evidence would the kind of verdict, mainly if not entirely, be decided. It is not at once sweepingly to be concluded that because the body of a child is found, as in this case, under suspicious circumstances, it has been feloniously destroyed; the mere discovery of the corpse, although it might highly favour the presumption, could not alone warrant arriving at such an inference; other inquiries would have to be made, and certain questions previously decided, for instance as to whether the child were at maturity, if it had maintained a separate existence, if its death had resulted from wilful or natural causes, what were the proofs of its having been maliciously destroyed, with like questions, which ought of course to be determined.

In former times concealment of pregnancy and of birth in this country was held a capital offence, and many unjustly suffered under this barbarous law; in later times, however, this and similar cruel statutes have wisely been repealed, and now none suffer where it has not been satisfactorily proved that murder has been really committed. The law, with a proper humanity, supposes all children to be born dead, the *onus probandi* therefore being thrown upon the prosecution, and not, as before, upon the accused. When a woman finds herself in a condition which, as soon as known, must bring disgrace, if such do not bring her to ruin; when she droops under the consciousness of self-debasement, and knows not how or where to seek for refuge or look for sympathy; week after week passes on in this dreadful state of irresolution and disquietude of mind; she dreads to reveal the big secret of her breast, which must be fatal to her respectability and the certain destroyer of her peace; perhaps by successful artifice she adroitly manages to hide her shame until very near, or even to the end of pregnancy; the mind has been long worried and excited by torturing reflections, the health has suffered, the spirits are depressed; labour with unexpected suddenness supervenes; in the agonies of mental and corporeal suffering, her anguish is so intense as for some time to deprive her of consciousness; the child is lost during the process of unaided delivery, or for the want of proper assistance dies after it has been expelled, and for a moment maintained an independent existence. Might she not on deliberate

reflection, after having regained her senses, and finding her offspring dead, dispose of the body with little or no compunction of conscience, by which the shame would be veiled from the public eye, reputation preserved, the feelings of friends be spared, and the future, instead of being misery, would be hopeful? She conceals it; the body chances to be found; the mother is made out, she is accused, and though innocent, few or none suppose so; she is arraigned for one of the deepest of crimes. Instances of this kind have occurred.

Again, temporary derangement has been known to come on about the time of delivery, from such and other circumstances, and might not the mother destroy the new being at a time when she was irresponsible for her actions? The child might be suddenly born when the woman was at stool, faintness and insensibility come on, and the infant suffers. To cite a case in point, the particulars of which I know, and where infanticide was suspected. The verdict of the jury was that the child died from suffocation, but by what means produced there was no evidence. The mother's story was that the child was born while she was attempting to have a motion, but she fell on the floor insensible, and when she came to her senses the child was laid on the floor, dead. She acknowledged placing it in the well a few hours after. The woman was acquitted of the grave crime of infanticide, by receiving the advantage of the possibility of the infant having so suffered, but she was punished by a sentence of two years' imprisonment, for concealment of birth. From the determination of blood which there is induced by the violent expulsive efforts in the encephalon, as also from the great irritative disturbance which the process of parturition is apt to produce in the cerebro-spinal system, temporary insanity might thus, as it does sometimes, occur. The writer knows of a person who has borne several children, in whom, towards the end of two or three of her pregnancies, mania became manifest, which, however, vanished soon after delivery.

It is clear, then, that it would be wrong to say, that because the body of an infant was under suspicious circumstances discovered, its life had been wilfully taken, and certain incontestable facts would in addition be requisite before we could conscientiously depose a statement so important. On a perusal of several authors on infanticide, it is surprising to see the indefiniteness of their statements, and that there appear to be exceptions to every rule associated with the subject. It is obvious an ingenious and well-read pleader might get off parties with whom there was no moral doubt of guilt, nor could they be punished unless confession were made, or there were actual witnesses of the deed. The medical evidence is summoned to give his medical opinion as deducible from what is seen *sub oculis*, and there his duties terminate; his depositions are to be made irrespective of prejudice, and it then remains with the jury to decide as to the nature of the verdict. The medico-legalist ought in all cases to base his inferences upon

a general review of *all* the facts, and not upon an isolated consideration, or he may incur the risk of erroneous deduction.

Respecting the body of the child, its general aspect rendered it manifest that but little time had elapsed since its birth, there being no indications of decomposition, nor indeed anything much dissimilar from what is perceived shortly after death. From the particulars which were given it was clear that it was at maturity and had had a separate existence. The length, the abundance of hair, the weight, and the well-formed nails, exemplified that it had been born at the full period of gestation. The length of the body of a matured infant at birth has on an average been stated at eighteen inches. It measured twenty inches. The hair and nails do not become perfectly developed until the last month of utero-gestation, but they reached beyond the tips of the fingers. Some have asserted that at the ninth month the umbilicus will be found inserted at the point corresponding with the exact centre of the body, which was the statement of Chaussier; but M. Moreau has more recently demonstrated this to be incorrect, for sometimes the insertion is an inch or an inch and a-half nearer the pubis. The saponaceous matter which is usually noticed at birth, and which by certain writers is deemed indicative of maturity, was abundantly present. At the ninth month the sebaceous secretion is copiously found on the skin. When children are still-born, the thorax, owing to the yet collapsed condition of the lungs, and the influence of external atmospheric pressure, has not that full and rounded appearance presented when respiration has been thoroughly performed. When free breathing has taken place, the intercostal spaces are completely obliterated, and the surface feels even to the touch. The plumpness of the chest rendered it presumptive, before any dissection had been made, that the lungs on being exposed would be found to have attained their normal magnitude of expansion, and this undoubtedly by the respiratory function having been properly in action.

On giving evidence at the examination on the inquest, I specially directed the attention of the jurors to the state of the funis, which was soft, shining, flexible, and pearly-looking; at its umbilical insertion there was not the least appearance of decay; of itself there was no wrinkled contraction, its colour was unaltered, and indeed in all its characteristics it was little, if at all, dissimilar from what it is at birth. The extent of the cord that remained was not less than three times the length that is left when it is divided in the usual manner by a midwife; and two additional points of importance were indisputably evident;—first, that it had been torn in two; secondly, there were no traces of any ligature having been applied. Being thus rudely rent asunder, and no string having been tied around, attested that the ordinary precautions had not been observed to guard against hæmorrhage, that is, supposing the child to have been born alive, of which there was no

doubt whatever, a practice which from custom alone is in common cases never omitted by those in attendance, and nurses and women-attendants are ever solicitous respecting the tying of the navel-string, and always ascribe to this duty more importance than is really of consequence. Any woman in attendance, where the ordinary care and preservation of the child were considered, would never think of forcibly breaking the cord; and in those instances where the child is precipitately expelled, when the mother is in an erect position, the laceration, as confirmed by experiment, by far most frequently takes place at one or other of its insertions, generally at the umbilical end; and supposing it to have been still-born, if no criminal intentions had been entertained by the mother, or party or parties present, it is fair to presume that some cutting instrument would have been employed. It is true, granting the presumption of still-birth, that they might be careless of the manner in which it was severed, yet such does not do away with the very high probability of the less grave offence—concealment of birth—but rather confirms the supposition. The manner in which the cord had been divided added to the suspicion of its being feloniously destroyed. We are led in this particular to give the accused the benefit of the probability that it had been broken during precipitate expulsion. When the cord is kept insecure, the infant may die from the loss of blood, which is termed *infanticide by omission*; yet if the circulation has undergone its proper change, but few, if the ligature were not applied, would die from hæmorrhage; nevertheless, such is the law, and where it can be indubitably proved that such precaution is willingly and maliciously omitted, the accused becomes liable to the penalty of the crime. When a child has thus suffered, the body looks white and bloodless, the large vessels are found drained of their contents, and little attention is required to correctly decide upon the cause of death. There were none of these appearances.

It was smeared with meconium. The escape of this matter has been deemed confirmative that independent life had been carried on; in other words, that the child had been born alive. This is merely mentioned amongst other facts, yet it is, perhaps, not much to be relied upon, because in breech cases, where the infant is still-born, the posterior parts are often covered with meconiumal matter.

The lineal mark on the anterior part of the neck from the excoriation, the distinct ecchymosis and the bruise-like patch spoken of above the clavicle, rendered it presumptive that such had not resulted from the wrapping round of the funis, nor yet from the only manner besides in which it could naturally have been done during parturition, namely, by the firm embrace of the edges of the os uteri after the head had passed out of the womb. Now, if it had been contended that the umbilical cord had strangled it, respiration would not then have taken place,

the lungs would have been uninflated, and thus the functions so necessary to life would have been prevented from ever having commenced, instead of having begun and been then suspended; but here the pulmonary organs gave undoubted evidence of respiration having been fully and perfectly carried on. But for the sake of argument we will suppose that the child was born alive, and that after its expulsion, the cord, from the altered position of the mother, or the movement of the child, became tighter, and thus prevented the ingress and egress of air, the lungs would not then by such imperfect respiration have been so entirely dilated, because the state of expansion in which they were found undoubtedly presupposed these organs having for a shorter or longer duration performed their functions normally. If it had been strangled by the cord the marks left would have been far less distinct, and very different from those ensuing from violence. The German writer Klein thus expresses himself on this point. He said he had never met with an instance of marks of injury of the kind supposed, ecchymoses or sugillations, produced by the orifice of the uterus, or the umbilical cord, although he had known a great number of cases in which the neck of the infant had been strongly girded by the funis once or twice twisted round it, strangulation having thus been actually produced or rendered most palpably imminent. The glairy lubrication of the cord would prevent such friction as would be required to abrade the cuticle; and besides, if the stripe had been produced in this manner it must needs have been broader and less clearly defined. On carefully dissecting down to the subcutaneous cellular tissue corresponding both with the line and bruise, extravasated blood, as mentioned, was at once apparent, and the substance of the sterno-cleido-mastoideus muscle showed that rupture and effusion of the minute vessels proper to its texture had ensued, which it is exceedingly probable had taken place during life. It is true, that, according to certain experimental writers, an ecchymosis *may* possibly be produced after death has taken place, owing to the capillaries retaining in some degree their action after the heart has ceased to beat.

It is said that capillary action is the last of all the corporeal functions in ceasing operation after the more manifest evidences of life, strictly so termed, are permanently suspended—the fibrillæ of nerves it thus appearing conveying the stimulus to vascular action, though in an impaired and imperfect manner, subsequent to the central organs having terminated their functions. Granting such doctrine to be true, we may, as said, conclude that the functions of the capillaries would then be but imperfectly performed, that their contents would pass along their course more tardily from the non-aeration of the blood and its consequent inspissation; hence it would not be so readily effused, and an ecchymosis thus produced would be far less perfectly formed than during life, and therefore

to ascribe the distinct, well-marked, and unequivocal extravasation, in this instance, to injury after death, would be highly improbable.

The accused has a right to the advantage of the most distant chances, and the common spirit of humanity alone would always dictate every leniency towards any one arraigned for so dire an offence; yet there is a converse duty indispensable for the maintenance of justice and the security of society, which renders it proper, and is imposed on all conscientious individuals concerned in these investigations, that any far-off possibility should not be made the loop-hole for the escape of crime, and the bearer away of guilt beyond the pale of the law. In evidence, it was given as an opinion that these marks had been caused during life. When the mark is deep, observes Taylor, and much ecchymosed, with extravasating blood beneath, and ruffling and laceration of the skin, it is impossible to attribute this to the umbilical cord. Orfila, respecting the signs of strangulation, says, a circular mark round the neck, with a corresponding effusion into the subjacent cellular tissue, indicates strangulation during life. That though it be impossible to deny that this mark was produced by the orifice of the uterus or the umbilical cord, yet, since no well-authenticated case warrants us in admitting it, it is a natural supposition that the mark in question is the result of criminal violence. That if this mark be combined with appearances denoting that respiration has been previously completely established, our inferences must be so much the stronger; for stricture by the neck of the uterus, or by the funis, cannot be supposed to have proved fatal with such appearances. That dark spots on the neck, without corresponding subcutaneous effusion, do not warrant the conclusion that the infant was strangled; and that, on the other hand, neither does the absence of such spots or such effusion, or of both together, strictly authorize us to conclude that strangulation did not take place.

The correctness of these opinions of that eminent medical jurist are incontrovertible, and well accord with the conclusions which must be deduced from the facts supplied by the case in question. Referring to the above report of the post-mortem examination, the reader will perceive that behind the pharynx, between the soft parts and the cervical portion of the vertebral column, some dark coagulated blood was discovered, and that the brain was in a highly congested condition, rendering it still more manifest that strangulation had been the cause of death. On removing the calvaria, the dark fluid blood that oozed away was considerable, and manifestly showed that there had been great determination of the vital fluid to this part, which had been owing to vascular obstruction.

The condition of the lungs as discoverable on dissection has been long considered one of the chief considerations in the medico-legal inquiries on infanticide. Harvey had certain notions concerning the conclusions to be arrived at from these organs, but afterwards

Rayger and Schreyer confirmed the hydrostatic test, and to them is undoubtedly due the merit of its first establishment. In a court of justice the medical evidence would most assuredly be asked many questions relative to these organs; hence in the autopsies we can never be too precise and careful in our particulars.

On exposing the thoracic viscera, the anterior margins of the lungs were found to overlap the pericardium almost to its entire concealment, and the diaphragm was less convex than it is when the lungs are in the foetal state. When the child has been avowedly still-born, a different state of things obtains; the thymus gland and pericardium are prominently in view; the lungs are quite back in the chest, almost at first giving the impression of their being absent; instead of being of a pinkish red, they are of a liver colour, feel dense to the touch, their edges sharp, and crepitation is not present; the thorax is not so ample, and it gives the appearance of being sunken and contracted. Traill says the chest of a full-grown child which has not breathed, measures from two to three inches transversely, and from about two to two and a-half inches from the sternum to the spine. When the same child has breathed, its chest will be from three to four and a-half inches wide, and about three in depth. In this case, the colour was exactly similar to that noticed when respiration has been normally performed, except on the posterior inferior parts, where there was distinct engorgement; the lungs filled the chest completely, nor was there any of that mottled appearance which is presented when the respiratory process has been but imperfectly carried on. Hence it was most presumptive that the child had lived and respired.

Traill gives the average weight of uninspired lungs at from 430 to 600 grains, and after breathing at 1,000 grains. And Taylor says the average weight of the lungs, *after respiration*, derived from three cases, was 927 grains, but in making an estimate of this kind much will depend upon the degree to which respiration has been carried. These remarks are correct, because a child will maintain a kind of tardigrade existence, and thus live even days, when but very small portions of the organs are distended, and if subjected to the hydrostatic test, they might in a great measure, and it has even been affirmed entirely, sink, where the child has lived. Taylor objects, and reasonably, to the statistical tables of Lecieux, who in his deductions has not made the requisite allowances for partial and imperfect respiration. It would have been more satisfactory if Lecieux had based his conclusions from the weights of children as much as possible the same, and where the lungs were in each thoroughly distended, but without these precautions his statistics are not nearly so valuable. The lungs of this child weighed 813 grains, which is less than the averages of Traill and Taylor. Most of the authorities on the subject, it will be found on reference, weighed the bronchi and trachea as well, which was not done in this case, as I merely weighed the lungs themselves; nor was any

ligature placed around the pulmonary vessels ; some blood, therefore, would escape which ought to have been reckoned. Hence, if this escaped blood, the bronchi, and trachea, had also been added, certainly not less than other sixty grains would thus have been obtained, and the weight therefore might with confidence be stated at 873 grains.

The lungs may swim when respiration has never been performed, when putrefaction has taken place, and when they have been artificially insufflated. Not the least decomposition had taken place, not only in the lungs, but in any part of the body ; besides, it is well known to pathologists that all the other viscera have a greater tendency to decompose than these organs. If this had been the cause of their buoyancy, there would have been fœtor, discolouration, the absence of crepitation, and other manifest indications of the putrescent state, with unequivocal decay of the other viscera. When the lungs float from the gases generated in decomposition, they do not so lightly swim upon the surface, and the pleural covering is raised with blister-like elevations, which, on being punctured, readily collapse. Any one but little conversant with morbid appearances might at once have seen that no putrescence existed.

When artificially distended, the inflation is irregular, the air insinuates itself into the interlobular cellular tissue, and bullæ are produced, which run in lines. It would have been impossible to inflate them, *in situ*, so thoroughly as they were distended, for even under the hands of an adroit operator, it is difficult to entirely fill them, and far more so by unskilful persons. The air will pass down into the stomach and bowels, and these organs are then found filled with air. It has been proved by experiment, that however perfectly the organs are artificially distended, such distension does not in any appreciable degree add to their weight ; whilst on the other hand, the process of breathing makes them almost as heavy again. The forcing in of air rather tends to make their weight less, because it forces out some quantity of watery fluid. Another great test is, that the air thus transmitted can by pressure be perfectly expressed, and the lungs be deprived of their buoyancy ; but when respiration has been performed, no degree of pressure, however powerful, can expel the air, and thus make them sink,—facts which have been particularly insisted upon by Beclard, and indeed by all recent writers upon the subject. As mentioned in the report, even small sections of the pulmonary tissue, however powerfully compressed, could not be entirely deprived of air, and made to sink. The increased weight depends not merely upon distension ; it is owing to the change in the circulation, to the cessation of fetal, and the institution of separate, life, and to the influx of blood, by which the vascular tissue proper to these organs becomes normally distended with the vital fluid. When artificial insufflation has been attempted, the lungs are almost invariably but

in part distended, the lower portions retain their foetal characters, and when placed in water the inferior parts fall towards the bottom.

Some rare examples have been recorded where children have breathed before delivery, when the mouth of the child was at the os uteri, which is termed *vagitus uterinus*; and where inspiration has been performed while the head remained in the vagina, such has been called *vagitus vaginalis*. These cases, however, are mere possibilities, and when they have taken place it has been in exceedingly difficult, or, perhaps, it might be said, always instrumental labours. From the thorough manner in which the lungs were filled with air, there could be no plausibility of reason in the supposition that they were distended by the kind of breathing described. There are cases recorded in which the foetal lungs acquired a considerable size from disease; but enlargement from such cause can be readily detected, for they are, when diseased, indurated, and present the characteristics of hepatization; and if from emphysema, that state is also distinguishable. The weight of the heart was 346 grs. It was long ago maintained by Brent, of Vienna, that immediately after the change in the circulating apparatus has ensued, the ductus arteriosus becomes manifestly altered; hence this has been called the Vienna test. More confidence was set forth in this opinion than facts substantiate, because it does not invariably present the appearances which he imagined never fail to follow the establishment of breathing. If this had been an infallible proof of inspiration, it must needs have been of paramount importance, and well-nigh rendered all other investigations supererogatory. The duct certainly was contracted in its central portion. The ductus venosus was empty, but did not show other indications of change. The foramen ovale was carefully examined, but the orifice closed; indeed it is generally some days before it is filled up, and I have seen it patulous in post-mortem examinations of the adult; its value therefore, in a medico-legal point of view, becomes very questionable.

In conclusion, a few points may be briefly reiterated. The length, weight, perfectly-formed nails, abundance of hair, together with other appearances, left not a doubt that the child was born at or near maturity; whilst the perfectly expanded lungs, the colour of these organs, their consistency, buoyancy, general crepitation, weight, etc., the contraction of the aortic duct, together with other signs, gave indubitable evidence that the respiratory function had been for a shorter or longer time carried on, or in other words, that it had supported an independent existence. The mark upon the neck, the excoriation, subcutaneous effusions of blood, frothy mucus in the bronchi, congestion of the lungs, bloody coagula discovered in the deep-seated parts of the neck, the considerable encephalic turgescence, and the effusion of dark fluid blood that escaped on removal of the calvaria, rendered it conclusive that the infant had been strangled; and if the suspicious circumstances under which the

child was found, together with the appearance of the funis, be also taken into account, there could be no moral doubt remaining that the child had been feloniously destroyed. Such opinion being deposed, the jury after a deliberate review of the facts returned a verdict of "wilful murder against some person or persons unknown."

Here may be given in illustrative contradistinction the appearances of a still-born child which I dissected. It was a small child, but from the quantity of dark hair, the well-developed nails, on both fingers and toes, as well as from its general appearance, there is no doubt of its having been born at or very near the full period of gestation. The mother stated that it was within a few days of the natural time, and was a *primiparous* birth; chest small and contracted; intercostal spaces, especially at the inferior anterior parts of the thorax, distinctly depressed. On opening the chest, the heart and thymus gland were prominently presented to view; lungs occupied the posterior part of the chest, and when brought forward were condensed liver-like substances; upon being squeezed between the fingers there was not the least crepitation at any part of the organ, and on being thrown into water readily sank to the bottom. The lungs weighed together 386 grains—right 203 grains, and left 183 grains, without the bronchi or any of the trachea. Heart rather small, and after it had been washed weighed 180 grains; ductus arteriosus and ductus venosus flabby and uncontracted. On reflecting back the scalp some bloody jelly-like matter, in the sub-scalpular cellular tissue, similar to what is generally observed consequent upon pressure during parturition; on exposing the external surface of the brain, the convolutions were seen normally developed, and upon making sections of the organ no præternatural vascularity was apparent. The other organs manifested their wonted characteristics.

If the reader compare the appearances discovered in this case with the first recorded, the very diverse conditions of the chest, the lungs, and the ductus arteriosus, cannot but be at once apparent. In this there was no lapping-over of the anterior margins of the lungs on the pericardium, but the heart and thymus gland, as mentioned, were prominently presented to the view. Again, the organs were of a dark liver-coloured red, not the bright pink as witnessed in instances where the function of respiration has been carried on; and instead of being buoyant, they quickly sank to the bottom. In this example the pulmonary organs did not fill the chest, but occupied an inconsiderable space, and on first opening the thorax it almost seemed as if they were really wanting, whilst the absence of crepitation, and their weight, exemplified the broad and evident difference between the examples contrasted. Regarding this illustration, then, as a negative proof, it tends to confirm the opinion that the suspected case had respired, and consequently been a self-existent being; and there can be no moral doubt of its being destroyed, and especially when the line on the neck, the great vascularity of the brain, together with other conditions, are also taken into account.

XLIV.

SUSPECTED POISONING.

THE following record of an instance, which so fully justified exhumation and pathological inquiry, and which was productive of so much satisfaction, cannot fail to be of interest. It was in the case of a young woman.

Post-mortem examination.—Body much emaciated, and muscles feel soft and flabby to the touch. Considerable livid blueness over abdomen, which is most intense over the hypochondria, and extends up to the thorax more on the left than on the right side. Slight congested appearance, from gravitation, on posterior aspect of thorax. Between the right trochanter and superior anterior spinous process of the ilium is a large soft tumour, about the size of an orange, and on the anterior part of this tumour is a dark roseate irregular eschar, measuring three inches from above downwards, and two and a half in breadth. On opening this tumour, four ounces of rusty-streaked pus escaped. At the flexure of the right ankle is a cracked irregular eschar, of about the size of a shilling; there is also an excoriation on the left hip of equal dimensions. Corresponding with the prominent part of the sacrum is a ragged sloughing ulcer, somewhat less than a half-crown piece. *Head*:—On reflecting back the scalp, a little above the supra-orbital region, is observed a congested patch, evidently the result of contusion, measuring an inch and a half in diameter. Removing the calvaria, the surface of the brain looks natural; cutting into the encephaloid mass, and exposing the centrum ovale, no bloody puncta are manifest, nor upon subsections of the organ can any anormal characteristics be discovered. Feels of ordinary consistency, and the cortical substance extends as far into the medullary matter as is generally observed in healthy subjects. No serum in the ventricles. On carefully examining the base of the skull, the right posterior tubercle of the sella turcica is much more acuminate than ordinary, and on placing the finger upon it, its apex feels sharper than natural. *Thorax*:—Removing the sternum, the lungs are not quite so prominent as natural, and their colour is anormally pinkish; little or no decomposition has commenced. Left lung adherent throughout to the pleura costalis by organized bands of lymph; on its posterior aspect is to be noticed some degree of congestion, and especially inferiorally. On the serous covering corre-

sponding with this is a transparent gelatinous exudation, which is easily broken down beneath the fingers. Several sections made in the organ show morbid redness; the colour in some parts, particularly in congested portions, is of a light vermilion hue. Crepitation, though less distinct in some parts, is nowhere entirely lost, and the organ lightly floats in water. Right lung also attached to the pleural lining of the thorax by morbid adhesions, but not so extensively as the left lung. On being removed, physical characters pretty nearly resemble those described of the left, but congestion not so marked and bright; redness not quite so distinct; is generally crepitant. No tubercular deposit seen in any part of either organ. *Heart*:—This organ is in every respect healthy, all its valves seeming competent to their functions. Pericardium contained four drachms of serous fluid. On excising a portion of the œsophagus from the middle of its course, the mucous membrane presents its wonted characteristics. No vascularity of any importance. *Abdomen*:—Liver normal in all its appearances; spleen small, but parenchymatous structure unaltered. Stomach externally manifests its wonted characteristics; in the cavity are contained two ounces of matter of semi-liquid consistence; vascularity of the mucous membrane not more than is often seen in the organ, where no disease of it has existed. In a few places adherent to its rugæ are a few small black depositions, which seem of a vegetable nature; beneath these spots, on being lightly scraped off by means of a scalpel, not the least degree of vascularity can be detected, and they seem to have excited no action whatever on the surface; they are insipid to the taste. On the lining membrane of the duodenum are a few slightly-developed arborescent patches; no ulceration nor excoriation; jejunum natural. Towards the lower extremity of the ileum, for ten or a dozen inches, there was considerable arboriform vascularity; mucous covering tolerably firm to the touch. On one part of the caput cæcum coli is some injection, but no ulceration. The arch of the colon presents no morbid appearance; sigmoid flexure much congested and vascular. Throughout the internal surface of the rectum is discoverable much ramified injection, extending about nine inches, and here and there are to be seen small but well-defined ulcers. Kidneys in every respect healthy. The uterus is particularly small, and on a longitudinal section being made, its substance is somewhat cartilaginous.

Tests used to the Contents of the Stomach.—1. Solution of ammoniaco-nitrate of silver gives a milky colour. 2. Solution of ammoniaco-sulphate of copper throws down a cloudy white. 3. Lime-water gives no precipitate. 4. The hydriodate of potash exerts no sensible effect. The manner in which the above tests were used was by adding a portion of the contents of the organ to distilled water in small test tubes. The small black patches were carefully tested by the above, but remained unchanged.

Casual circumstances sometimes so occur as to create surmises,

and give a colouring to opinions that would otherwise have been deemed most improbable, or never been entertained ; and so it was relative to the case calling forth these brief observations :—A person, residing in a lonely part of the country, chanced, in the course of a few years, to lose three inmates of his house, all dying suddenly. First, a former wife, next a housekeeper, and, lastly, his daughter, who was at the time of her decease, and had been for several years previously, insane. No medical man had attended her, although it was proved she had been in a failing state for some time before she died. Through an irregularity no inquest was held prior to her interment, and certain (when investigated) satisfactory circumstances rendered it necessary that her funeral should take place at an earlier period than was customary. A fortnight subsequently a report became prevalent in the district that she had not died from natural causes ; information consequently being given to the coroner, he, in discharge of his duty, issued a warrant for the exhumation and examination of the body, and that gentleman employed me to make the post-mortem inspection ; and as there appeared, on a review, to be some points of interest associated with the case, both pathologically and medico-legally, I have thus been induced to insert it here. Great are the responsibilities in being summoned to officiate in an instance like the present ; and highly important was it that a correct opinion might be formed of the case, because reputation, nay, more, the most weighty dependences, were based upon a right decision. The coroner, very judiciously, ordered a careful examination of the body before entering into a detail of evidential inquiry, and thus the medical opinion as to the cause of death was more likely to be unaffected by preconception and prejudice. The medical man when engaged to give his opinion in medico-legal cases has nothing whatever to do with the statements deposed by witnesses ; he is employed to give his professional opinion as to the extent of injury, or the cause of death, and in this decision it is highly desirable that his mind be unbiassed by any preconceived notions from vague reports, or hearsay suppositions. In all country districts, prejudices are deep-rooted ; and there is much repulsive feeling against post-mortem examinations, even amongst those who assume to be of the educated and better classes. In this case it would have been absurd to merely exhume the body without a dissection, and the coroner very properly insisted upon definite depositions being made relative to the morbid appearances to be discovered in the viscera.

On reference to the foregoing details of the inspection, it is mentioned that the body was in a state of considerable emaciation ; and that above the right trochanter was a large abscess, which, from the consideration that similar collections had formed spontaneously in other parts of the body under the integuments, was evidently of a scrofulous character. Some cases came under my notice in a certain degree analogous—that is, where scrofula and insanity are combined. One man had several scrofulous abscesses in different parts

of the body, but especially in the subcutaneous cellular tissue forming what surgeons denominate *cold abscesses*. He was of phthisical tendency, and gradually lost his reason. On inspection there was discovered a greenish yellow deposition of pus at the base of the brain, and the surrounding parts of the organ were decidedly softened, more especially the medullary part. Previous to the examination of the brain of this young woman, I rather suspected a similar condition, which, however, as the report shows, was not the case. On exposing the brain, the vessels proper to its structure, and the membranes covering it, were not at all engorged; there was none of that venoid appearance which is observed where narcotism has preceded death, and under the poisoning by laudanum. There were no bloody puncta on making repeated sections of its substance; no abnormal quantity of serosity infiltrated into its ventricular cavities. It has been stated, I may here observe, by certain morbid anatomists, of the insane, that enlargement of the clinoid processes, producing pressure at the base of the brain, has caused insanity; and certainly in this case the posterior processes were decidedly more acuminate than ordinary; but whether it would be right to subscribe to the asserted opinion, is very dubious, until more irrefragable data confirmatory of its truth have been amassed.

From the morbid characters presented by the lungs, it is impossible to dispute the existence of inflammatory action at the time of death, as the parenchymatous structure bore the obvious traces of pneumonia in its first stage; yet such was not of itself sufficient to cause, although in a patient so debilitated it might have expedited, death. On the serous surface of the left lung were recent fibrinous depositions, and the natural crepitaney was diminished; which remarks also apply to the right lung, but in a less degree. The congestion noticed at the base of these organs was more the result of gravitation than from obstructed circulation. In all cases we should distinguish between diseased congestion and that state which is produced by the gravitating of the fluid, and which is always most distinct when the patient has been lying on the back. Those conversant with morbid appearances can readily distinguish between the two. The heart, œsophagus, the mucous membrane of which organ it is always desirable to carefully examine in cases of this description, as irritant agents invariably produce greater or less excoriation, liver, spleen, stomach, jejunum, and kidneys, were found natural. In the course of the ileum, at the caput cœcum coli, and sigmoid flexure, a præternatural state of vascularity existed; and the rectum was not only in the same state at several places on its mucous membrane, but there were also distinct points of ulceration. Now, these appearances might, *primâ facie*, have been considered as the result of some irritant agent applied to the digestive surface; but when it is reflected that the patient for some weeks was reported to have had a bowel complaint, and this of a dysenteric character; that the morbid conditions were

not of a recent, but of a chronic nature ; and, above all, that the stomach was found healthy,—it became highly probable that such were the result of spontaneous disease, and not from irritant poisons. Whenever irritants have been swallowed, the mucous membrane of the œsophagus and the stomach are sure to be affected, and there most especially the lesions are discoverable. There is diffused inflammatory redness ; the mucous membrane acquires a reticulated vascularity, with softening, gangrene, and irritable obstruction of one or more of the tissues. In the lower bowels the same description of lesions is discernible, though in a less degree than what takes place in the higher portions of the canal. Chronic vascularity of the mucous surface differs in certain respects, and by these we may decide between that which is recent and that which has for some time existed. In the one there is diffused redness as well as tortuosity of the vascular branches, resulting of course from capillary distension ; but in the chronic form the inter-arborescent spaces have acquired their former colour, dependent upon the capillaries proper to such parts having contracted to their former calibre. The smaller vessels of a part more readily resume their former condition than the larger, because it is with the capillaries that the resolution or salutary change first commences. When for some time there has existed obstruction in these minute vessels, the smaller branches of the arterial and venous systems which arise from them are obstructed also ; hence their calibre is increased, and thus results that state of preternatural distension which we term vascularity, and as the capillaries soon resume their natural condition, these branches remain in a state of tonic fulness when the inflammatory blood has disappeared. It is on this theory that the nitrate of silver and some other remedies have their beneficial effects ; they stimulate the tunics of the vessels, which from impaction of their contents had lost their natural contractile functions, and thus by astringing these vessels a cure is effected. Reasoning from these considerations, taking into account the above-mentioned facts, viz., the existence of a dysenteric affection, the considerable emaciation, the inflammation of the lungs, that the patient was insane, and consequently masking symptoms that might otherwise have been more prominently manifested, that the stomach showed none of those traces common in irritant, nor the brain the characters so frequent in narcotic, poisoning, I gave it as my opinion that the patient had sunk under natural causes.

The statements of the various witnesses examined at the inquest fully confirmed the conclusion advanced in the medical evidence. The deceased had always partaken of the same food as her parents ; for some time she had gradually lost flesh, had become more wan and emaciated in appearance, but as she was so totally devoid of reason, any indisposition could only be judged of by her looks. Some days before her death they considered her not so well,—the diarrhœa was in particular mentioned, and they had consulted a practitioner

a month previous to her death, respecting this affection, but that gentleman did not see her, and ordered them to give her a few drops of laudanum, under which remedy little or no benefit accrued. The day previous to her death she had an urgent thirst, which might have been anticipated where active inflammation was going on. The mother, on taking her breakfast to her in bed, saw that she was then very ill, she became rapidly more enfeebled, and soon expired. The jurors, on a deliberate review of all the circumstances, and the facts detailed in medical evidence, without any hesitation returned a verdict of death from natural causes. Had an inquest taken place previous to her interment, which ought to have been the case, but from some mistake or irregularity was omitted, no post-mortem examination would have been required, and the friends, who for a time were much distressed at the painful imputation, would thus have been saved a considerable amount of mental suffering.

Scrofula and insanity are often observed as cause and effect. The morbid states mostly noticed in the brains of those who have died insane are præternatural vascularity, softening, much serosity, induration, thickening of the membranes, atrophy, abnormal development, and osseous prominences. Esquirol and some other writers have stated that occasionally no lesion exists in this class of patients. The microscope has long since shown the fallacy of such opinions, and in mental affections there is doubtless always physical change in the ultimate structure of the organ through which the mind acts.

XLV.

POISONING BY LAUDANUM.

THE following is an illustrative example of what occurs when laudanum and other preparations of opium are taken in poisonous quantity. Many years ago, a maid-servant, aged nineteen, of sanguino-phlegmatic temperament, muscular system well developed, healthy-looking before the attack, suddenly became ill. I was quickly summoned, it being reported that she had fallen down in a fit. On arrival I found her laid in a helpless and prostrate condition; countenance looked sunken and congested; pupils dilated, and the right of greater diameter than the other; had vomited, and the ejected matter seemed to be more than half a pint, and emitted a strong spirituous odour; no bowel complaint, but sickness was persistent during the first half hour, after which she sank into an alarming collapse; pulse 60, of tolerable volume, felt labouring and oppressed to the touch. The inmates of the house being interrogated, it was reported that she had during the previous part of her servitude always manifested cheerful or rather buoyant spirits. No particular quarrel or disagreement had taken place between herself and mistress, nor with any other individual, as far as could be ascertained. Her fellow-servant stated that she had that morning prosecuted her wonted avocations in the ordinary manner, nor did she perceive anything unusual either in her appearance or vivacity. At half-past eight o'clock she was found helplessly reclining in an arm-chair, being quite unconscious of her situation, and was carried into another apartment, in which I first saw her. At first it might have been considered a fit, from the sudden manner in which her illness supervened, but it was pretty evident, on a general and deliberate view of the case, there were far greater reasons for concluding that poison had been taken. The stomach-pump, without loss of time, was introduced, and the organ washed out two or three times with warm water. She was now carried, being quite powerless, to a warmed bed, hot bottles were applied to the feet, fomentations to the epigastrium, sinapisms to the legs and along the region of the spine; other parts of the body were vigorously rubbed with hot flannels, and ammonia was applied to the nostrils; and shaking incessantly was also had recourse to, indeed, she was never allowed for a moment to rest

quietly. For some time her case seemed very doubtful, the prostration was so great. She was treated for narcotism, though no further light had yet been thrown upon the case. After some time a low and indistinct muttering was at intervals elicited, and in half an hour from this her cries began to be stronger and louder, when she began to struggle, and gave evidence of experiencing pain from the mustard plasters. In the course of another hour she partially opened her eyes, and in no long time at intervals called out for her mother. Soon afterwards she manifestly became conscious of her situation, and although she remained lethargic and dull when not interrogated and left alone, yet upon questions being put she answered rationally. The rubbing and agitation were yet persevered in.

As she gradually regained her intelligence, it was repeatedly asked what she had taken, yet such inquiries could elicit no other reply than the monosyllable—RUM, and she persistently denied having taken any description of poison. From the general appearance of the case, and a deep conviction of the want of truth in this statement, I determined not to cease in my questions until she made a true confession. At length she said she had swallowed laudanum, with an intent to destroy herself. More rigorous inquiries gave the information as to where the bottle had been deposited. From the accounts of herself, as well as the statements of others, it was ascertained that two or three days previously her mistress had procured half an ounce of the tincture of opium, of which not more than a few drops had been used. The vial—a four-drachm one—was, as the girl told us, placed in a tumbler glass, on a shelf, which on being produced showed that only a portion of its contents had disappeared since the previous evening, at which time the mistress saw the bottle full. The patient stated that on seeing the vial she took it, and mixed a portion of the poison into a wine-glassful of *dry* rum, which she quickly swallowed, and then in a few minutes became unconscious. There were no circumstances inferring that she was pregnant, and her character was that of being a virtuous girl. It was subsequently ascertained, that on one or two occasions not long before, she told one of her acquaintances that she had an impression “she should die soon,” although, as above remarked, she was not, nor had been, of melancholy mood. She regained her wonted spirits, and never alluded to her indisposition.

It is not without being fully aware that of all descriptions of poisoning, that by opium is by far the most common; and when it is remembered that innumerable cases occur which do not go on to a fatal termination,—and, therefore, are unknown to all save the few individuals amongst whom they happen,—the total number of instances of poisoning by this drug annually must be very considerable. When summoned to a case manifesting the symptoms of narcotic poisoning, there are not unfrequently perplexing appearances, because

such an instance might simulate other diseases, and other diseases liken this affection. An error of this kind is most likely to occur where there is no clue to conduct the practitioner into a right way of viewing the case beneath his notice. A correct detail of such particulars as might be elucidated from those who were acquainted with the previous history of the patient, together with all the collateral information which could be gained at the moment, ought to receive the most scrupulous attention; and will be found of paramount importance in assisting us in arriving at the proper conclusion. On a perusal of the above case, however, it will be observed, that there was very little or no aid to be derived from the depositions of others, as there were no circumstances leading to the supposition that the patient had herself committed the rash act. No vessel had been found with regard to her previous conduct; no vessel was discoverable that contained any deleterious matters; indeed, no conclusion whatever could then be come to as explicable of the matter. By the comatose symptoms supervening with so much celerity, apoplexy was not a little resembled; and as regards the sickness, we know that vomiting very often occurs during the apoplectic seizure. But apoplexy is more liable to come on in those advanced in life, and, notwithstanding it sometimes does occur that young people of both sexes at this age die of apoplexy, yet such cases are of very rare occurrence, the mere exceptions to a general rule. There is not much risk of mistake with epilepsy; in the epileptic paroxysm there arises much more tonic convulsive agitation of the limbs; there is foaming at the mouth, a rigidity instead of flaccidity of the muscles, the convulsions cease, and during the intermissions the lividity of the countenance, etc., disappear, until the return of another paroxysm. Now, under the influence of narcotic poisoning the facial congestion does not alternately go and return; poisoning by opium, however, has been regarded and treated as epilepsy, but the mistake is much more liable to be made where prussic acid has been the noxious agent employed.

The states, then, which may be mistaken for this kind of poisoning are apoplexy, deep drunkenness, and epilepsy. It is reported that a strong spirituous odour was emitted from the ejected matters; was it then deep intoxication? An extreme degree of drunkenness has been treated as poisoning, and conversely, cases of poisoning regarded merely as drunkenness. In this example it was very conclusive that rum had been drunk, but in what quantity was then unknown, and from being thus satisfied that spirit had been taken, such fact was not a little likely to mislead and allure from the real cause of the affection. Now, if it had been drunkenness, this state of helpless prostration could not possibly have come on so soon as in from ten to fifteen minutes, and that it did supervene thus rapidly there was unquestionable proof, because in no longer time previously she had been seen prosecuting her usual duties. Again, having vomited so freely, as manifested by the ejections, one

might have supposed that the whole or most of the spirit would have been expelled from the stomach; besides, the lividity of the countenance, the declension of temperature, and other symptoms, presented more the features of poisoning than drunkenness. Intoxication, Taylor remarks, has been considered to retard the operation of opium. Observations of this kind must of course be accidental, and there is scarcely a sufficient number of cases reported of narcotic poisoning under these circumstances to justify a decided opinion on the point. It was observed of a person who had swallowed a strong dose of opium while partially intoxicated, that the symptoms were some hours before they were manifested. Perhaps, strictly speaking, the symptoms in these cases are masked. The retardation of the operation of the drug by being taken with intoxicating liquors will evidently depend upon the QUANTITY of the latter which may be drunk; if only a small portion, it is fair to infer that such would act as a stimulant, and consequently counteract the effects of the poison; but when much liquor has been simultaneously swallowed, instead of acting as a stimulant, it would rather prove a sedative, and thus favour more than oppose the effects produced by the poison, because we know that all descriptions of stimulants only stimulate to a certain degree, and beyond this point they become sedatives. Moderate cold stimulates; when excessive it is a sedative, producing sleep, coma, or death. Stimulants are those agents which operate by accelerating the actions of a living part, which are chiefly manifest by heightening the circulatory function. Now, when such agents are particularly applied to the vital organs, the vascular functions of those organs are first considerably increased, and precisely commensurate with this anormal increase of action, follows a declension of power; and thus we see that this sequel must depend upon the power of the first cause. Increase of action, therefore, can only be rendered excessive to a certain point, after which it declines, and the effects, as already said, are proportional to the extent of the agent or agents which thus operate upon the frame.

In the instance of this young woman, only from one to two wine-glassfuls of neat rum had been taken, and in the sickness a great portion must have been vomited; it is, therefore, fair to conclude that the spirit could not have had considerable effect in the induction of any particular results, and certainly there is reason to believe that the liquor would, according to the views now given, tend to avert more than accelerate the hypnotic qualities of the poison, because the portion retained must have rather stimulated than otherwise. It is of paramount importance, then, in all cases where spirit has been swallowed along with a narcotic poison, to know, if possible, the quantity of liquor drunk, because with the possession of such information our fears might be in some degree allayed, or we might then become more accurately aware of the real extent of the danger. The time intervening between the swallowing of the poison and its effects becoming apparent has been known to vary considerably,

and very much depends upon whether a solid or a liquid has been taken, the former of course requiring a longer period than the latter, that is until the drug becomes reduced to a solvent state. Poisoning by laudanum is always more speedy than by opium. In this case it is seen the symptoms supervened in the course of a few minutes, which was unusually quick; in an instance recollected, the effect came on in from twenty minutes to half an hour. It is often from half an hour to an hour before very marked indications be present. The period at which death generally takes place differs under apparently like circumstances, but is most frequently from ten to twelve hours; in the case just referred to, the patient, a woman, died in about four hours and a half. There is every reason to suppose that in the instance of the young maid-servant, inferring from the fearful degree of collapse into which she was thrown, she would, had not the proper expedients been had recourse to, have perished in a shorter time still. The poison always kills the young with more rapidity than the adult, owing to the greater sensibility of the sensorial functions, and the more speedy and grave manner in which a return is made upon the vital organs.

Regarding the quantity requisite to destroy life, so far as my own researches have discovered from the various authorities on this subject, the dose taken by this young woman, and by which there is every reason to suppose she would have been killed, if she had been left to the effects of the poison, is the smallest quantity to be followed by such grave results which I can find recorded. Certainly not one hundred drops had been taken. "The smallest fatal dose of the tincture in an adult which I have found recorded," says Taylor, "is two drachms. The patient was a robust man, aged fifty-six. He swallowed the tincture at ten in the evening, and died under the usual symptoms on the following morning, the case thus lasting only twelve hours."

There are certain idiosyncrasies which it is impossible to foretel where death is produced with that which to another would be but an innocuous or even an effectless dose.

In this case, where vomiting supervened so immediately after the poison had been swallowed, the amount retained, and which was followed by such grave consequences, must needs have been very small indeed, and when reflected upon, in a medico-legal point of view, becomes of some interest.

It may not perhaps here be considered out of place to give a few particulars relative to the other case above alluded to. It was in the person of a plethoric young woman, of apparently five- or six-and-twenty years of age. It appeared from subsequent inquiries that she had gone into a dram-shop, called for some whiskey, and unobservedly added the fatal potion. In no great length of time she dropped into a deep sleep, and then helplessly fell from her seat. The pupils were contracted, face livid, pulse slow, skin cool, breathing laborious and somewhat stertorous. On raising an arm or a leg it

fell listlessly into its former position, in all the passiveness of unconscious prostration. Without loss of time I introduced the stomach-pump, and threw in most of a quart of tepid water, which was immediately pumped out again, and thus the process was repeated to the third time, by which means the organ was thoroughly laved out, and such noxious matters as remained extracted. She was then placed in a warmed bed, and for three hours I tried every remedy that might be deemed of service, but without avail, as she died, as before stated, in about four hours and a half after having taken the mortal draught.

Making an examination of the body, and on removing the calvaria, considerable vascular turgidity was most obviously apparent, the superficial vessels being dark, tortuous, and distended with venoid-looking blood. Exposing the centrum ovale, numerous bloody puncta were demonstrated, and in fine, the whole encephalic mass was considerably engorged. There was not much serum infiltrated into the ventricular cavities, which probably was dependent upon the short period in which death had been induced; in cases where they linger on from twelve to twenty hours, serous exudation is more commonly observed. The lungs were quite anormal in their characteristics, being intensely surcharged with dark venoid blood, and the right ventricle of the heart was loaded with a gory semi-fluid mass. The stomach presented no traces whatever of disease. These are, I believe, the most frequent morbid appearances, and sometimes sanguineous extravasation is found, resulting, of course, from the encephalic vascular obstruction which is induced. The principal morbid appearances, says Traill, are great turgescence of the vessels of the brain, and sometimes serous effusion between its membranes, or in its ventricles; but sometimes no morbid appearance can be detected in the head; the lungs are gorged with blood; the stomach rarely appears inflamed; the blood is found fluid in the heart, and the body runs rapidly to decay. The stomach and intestines, says Taylor, present no unnatural changes. There is greater or less fulness of the cerebral vessels, but even this is often so slight as to escape notice unless attention be particularly directed to the brain. Again, that author says, in a case which proved fatal in fifteen hours, examined at Guys Hospital, the vessels of the head were found unusually turgid throughout; on the surface of the anterior part of the left hemisphere there was an ecchymosis, apparently produced by the effusion of a few drops of blood; there were numerous bloody points on the cut surface of the brain; there was no serum collected in the ventricles; the stomach was quite healthy. This may be taken as a fair example of the post-mortem appearances in poisoning by opium. Comparing the accounts given by these authors, as to the lesions discoverable in poisoning by narcotics, with the particulars respecting the inspection made by myself, the reader at once perceives that they very much resemble each other, and doubtless the conclusions arrived at by these two

medico-legalists are mainly right, and as a general view, are in accordance with facts. It seems rather surprising that the latter should have passed over a condition which is perhaps quite as often present as the vascularity of the brain—viz., the pulmonary engorgement which is there so frequently detected. Traill very properly notices this lesion in his enumeration of the chief appearances.

Returning to the case first recorded, so sudden was the operation of the poison, that when I saw her, certainly not more than half an hour afterwards, she was so prostrated that it would have been quite impossible to make her walk about. The line of treatment, it will be seen, was such as is generally had recourse to in these instances, consisting in keeping up, as much as possible, the circulation, and never allowing the patient to sink into repose. For some time the efforts threatened to be inoperative, but ultimately the lividity became less apparent, the surface warmer, the countenance more natural, when incoherent murmurs were elicited, and at the expiration of two or three hours she was considered beyond danger. As all rational systems of treatment should as much as possible be founded upon the observation of, and the inferences deduced from, demonstrative facts, a review of the morbid appearances discovered in the case in which inspection was made, may perhaps tend to confirm us in our decision in what such most properly consist, and especially if some of those late physiological discoveries which have been made are at the same time remembered. If we are to regard the nervous system as having three distinct functions, or as being divisible into three other systems,—the vital, sensorial, and muscular, properly so called,—we can then more correctly account for the manner in which death is proximately induced, and decide better as to the way in which the fatal termination is most likely to be averted. The sensorial functions being affected, whatever impressions are made upon these, are in an exact ratio to the sum of such impressions transmitted to the other two functions,—viz., the muscular and vital; when, therefore, from whatever cause, the sensorium is rendered unequal to the due exercise of its functions, as by a direct loss of sensorial power, which an agent like the one now spoken of is capable of producing, the two other functions are not efficiently performed, are carried on anormally, and their action, through such morbid impression, deteriorated by the agent in question, may be entirely suspended, and, of course, death ensue.

Eminent physiologists in this and other countries have shown that respiration is caused by, and under the immediate influence of, three distinct functions,—the sensorial, vital, and muscular functions; that it is a compound and voluntary action. Now, when the sensorium is affected, sensibility diminished or destroyed, the function of respiration becomes commensurately disordered or wholly ceases, because this action cannot be carried on without the stimulus of the sensorial functions, the respiratory muscles otherwise cease to

act, and the vital functions, properly so called, also cease. Respiration being a voluntary act, the loss of sensation is also followed by the loss of pain, and when the sensation of pain no longer obtains, the respiratory muscles, as said, no longer are urged to their natural exercise; hence congestion in the vital organs, and if continued, death. The brain, spinal marrow, and lungs especially, become overloaded, and thus they then also superadd to the deleterious states already noxiously existent in the system. The capillaries fail to normally propel their contents unless stimulated by arterial fluid, which appears from the philosophical investigations of M. le Gallois, Wilson Philip, and certain other experimentalists, to be their proper and only stimulus; therefore, when the blood is no longer duly arterialized, congestion must result in the vital organs, from the cause now given. The nervous influence so necessary to all the vital processes, and which is the proper and indispensable stimulant of the vital organs, properly so called, cannot be generated by, or eliminated from, the central organs of the nervous system, unless these organs are unaffected in their functions; but when they receive a morbid impression from the operation of some noxious agent, as a narcotic poison, the results as above enumerated ensue, and this agent, it is quite possible, may primarily act upon the vital and muscular, as we know it does upon the sensorial system.

From what has been advanced then, it is quite obvious that our endeavours should be zealously directed towards the maintenance of the sensorial functions, because we know of no antidote to this poison, and because the legitimate inferences of the views now stated seem to demand such conclusions. The patient, whose body I examined, undoubtedly died in part as from asphyxia, because it was related that the lungs were intensely congested, and there was præternatural vascularity and obstruction in the other vital organs. It has been ascertained by certain experimentalists, both in this and other countries, that the nervous influence is, in all its appreciable qualities, identical with, and its phenomena similar to, an agent in inanimate nature—viz., electricity; and that this agent, when applied to those organs whose office is the transmission of the nervous influence from the central organs of the nervous system, has the power of stimulating to their normal action those organs upon which life immediately depends, commonly called the vital organs, even when the sensorial functions are very evidently impaired; this, therefore, seems a proper remedial measure to be employed in cases like to this now particularly considered. A powerful narcotic, as observed, makes such a morbid impression upon the whole of the organs constituting the nervous system, that their proper functions are gravely altered, and that stimulus—the nervous influence—is no longer secreted by, if such term may here be used, nor consequently transmitted for, the carrying on of the vital processes. If, then, the heart and lungs can for a time be artificially carried on, or materially assisted by this agent from inanimate nature, that is, until the

poison ceases to exert its pernicious effects, and the circulation thus continued, great hopes of recovery might thus be entertained, and doubtless some fatal terminations averted. The circulation might also be considerably assisted at the same time by means of artificial inspiration, and thus aiding the due aeration of the blood, when the capillaries would receive a greater quantity of their proper stimulus, and free the vital organs in their action. I am fully aware that both the former and the latter have been recommended, nor is there anything new in these remarks; the only design in making the previous desultory observations is to show that such remedial measures are founded more upon a rational basis than may be generally admitted, and if possible, where these cases occur, to strenuously recommend their adoption. I remember an instance in which voltaic electricity was eminently serviceable.

In conclusion the following facts may be reiterated:—1st, The symptoms supervened with unwonted suddenness. 2ndly, The quantity of laudanum retained must have been very inconsiderable, rendering it surprising that such fearful symptoms should follow so small a portion of the poison. 3rdly, The spirit in which it was taken did not appear to exert the retarding influence ascribed to it by Christison and others. Lastly, The pupils were dilated, one more so than the other, which is contrary to what is by far most usually the case—viz., their contraction.

XLVI.

LEAD PALSY.

CASE I.—A short, thin man, a house-painter, aged forty-six, was admitted into the Tunbridge Wells Hospital. He stated that he had all his life been occupied as a painter, but never had been affected before the present attack. On admission it was with difficulty that he could raise the forearms from the body. Both hands had the kangaroo drop. Blue line of gums was very distinct. The symptoms commenced suddenly with constipation and tormina. The bowels were cleared out with castor oil and a few drops of laudanum. He was ordered a mixture with sulphuric acid and sulphate of magnesia in a bitter infusion, and a warm bath on alternate nights. During the next ten days or a fortnight he made scarcely any improvement. The treatment latterly recommended, of repeatedly blistering the nape of the neck, was freely tried, but without producing any beneficial effect. He was then ordered a mixture with the iodide of potassium in infusion of quassia, and electro-galvanism to the arms twice a day. Under these remedies he began to improve, and was discharged at the end of four months better, but not well.

CASE II.—A gasfitter, aged forty, was admitted. Volume of flesh not reduced. Had generally had good health. Ten weeks prior to admission he began to experience pains in the limbs, and constipation and griping. On admission, both hands drooped. Had the power of pronation, but not of extension. Blue gum-line well defined. To have his bowels moved with castor oil and a few drops of laudanum, and a mixture with sulphuric acid, sulphate of magnesia, and infusion of quassia. A warm bath every second night. He was afterwards ordered iodide of potassium in bitter infusion and electro-galvanism twice a day. At the end of eight weeks he was discharged well.

CASE III.—A powerful, well-built, blue-eyed, fair-looking man, aged thirty, who had always been employed as an agricultural labourer, was admitted September 8th. On being closely interrogated, it was at length unquestionable that cider drinking was the cause of his malady (*colica damnoniensis*). It had been for years the custom

of his employer to allow the farm servants during hay time and harvest three quarts of cider per diem. In the autumns of the four previous years the patient had had attacks of violent torminal pains, always accompanied by constipation. These attacks had not been attributed to the cider, though they ceased when this beverage was not taken. The water which he drank did not pass through leaden pipes, nor could his food or drink in any way be contaminated by lead. On the morning of August 18th, when reaping corn, much aching of the arms came on, and in the evening of that day so much powerlessness of the upper limbs was experienced that it became difficult for him to hold the implement in his hands. The next day he was utterly unable to pursue his occupation. No griping pains, and the bowels were not, as they had been in previous years, obstinately confined. On admission, both arms hung so powerlessly by his side that the hands could not be raised more than a few inches from the body. He had no pain in the upper limbs, and declared that as regarded his general health he felt very well. The characteristic blue line on the gums was most distinct. The muscles of the forearms were not much smaller than normal, if, indeed, they were at all reduced in volume. On further inspection, it was found that both deltoids were remarkably atrophied, and the wasting of these muscles was so apparent as to be a disfigurement. The sharp, lean, bony shoulders incongruously associated with the fine full muscular development of all other parts of the frame. He was ordered sulphuric acid, sulphate of magnesia, and infusion of quassia; the warm bath, and electro-galvanism. Subsequently he had the iodide of potassium in bitter infusion, instead of the above-named mixture. Under this treatment he made a steady and continuous progress, and at the end of eighteen weeks he was discharged well.

In these cases the metal passes into the system in three ways—by the ingesta, by the integuments, and in some cases, as in manufactures, where the patient has been exposed to the inhalation of vapours containing lead, by the pulmonary mucous membrane. Its effect is soonest produced when the poison is conveyed into the body by food or drink, or by inspiration. When cutaneously introduced, many months, or even years, may pass before the specific effects are proclaimed. In the slow process of its absorption, colic, in the majority of instances, precedes the palsy. Of 102 examples of lead paralysis given by Tanquerel, forty were not preceded by colic. The blood becomes entirely contaminated; but, curiously enough, as it is well known, and from the more exact observations of Budd, Wilson, and MM. Dauvergie and Guibourt, all organs and tissues are not equally susceptible of its influence. The spleen and muscles of the forearm have been found to contain the greatest amount on analysis. In the third of the above cases the deltoids and the thumb muscles were most acted upon. It sometimes occurs that only the balls of the thumbs, or even the muscles of a single finger, are selected by the caprice of the poison. Certain ill-understood conditions of the con-

stitution favour its pernicious operation, because, as in painters and others, a number of persons may be similarly exposed to the absorption of the poison, and it is only in exceptional cases that the body is impressed by the agent. John Hunter described the condition of muscles paralysed by lead poisoning as of a cream colour. This change of appearance is now known to be the state of fatty degeneration induced by mal-nutrition, and the substitution of oil-molecules for the true sarcolemma. The nerves proper to the atrophied muscles secondarily become affected, and in the worst forms of the disease the great nervous centres become diseased. Budd discovered lead in the brain-tissue; and, according to Todd, in those instances in which the encephalon gravely became implicated, and in which there were epileptoid convulsions, patches of white softening, and an abnormal opening of the sulci, were the pathological appearances. The symptoms of this complaint come on gradually, and not suddenly, because the loss of healthy nutrition of the parts is a slow process, which induces an atonic state of the motor nerves. Flaccidity is the characteristic. In cerebral paralysis the limbs may relax from spasmodic closure. In lead atrophy they remain the same. When faradisation is applied in the first named, motor influence becomes apparent; in the latter there is no increase of excitability conferred. Again, the history of the patient, and the gum-line, will point to a correct diagnosis.

The recovery is always slow, sometimes exceedingly protracted, and more especially in those who have been intemperate, because in such the functions of the great depurative organs, the liver and kidneys, are often, from structural change, imperfectly performed. The two cardinal indications of treatment are, the elimination of the poison, and the restoration of the disturbed or suspended functions. To first act on the great emunctories is the rational mode of procedure. The ancients took this view. Nicander and Celsus prescribed vomiting and purging,—a practice now pursued at La Charité. Various purgatives are given by the French physicians, such as jalap, scammony, senna, and the sulphate of magnesia. Emetics of tartarised antimony, and enemata, are employed in the earlier stages of treatment. Kapeler recommends alum and sulphuric acid, and in Germany these remedies are much used. Warm baths are generally followed by decided benefit. Todd gave the sulphur bath, which was, with two or three ounces of the sulphuret of potassium, mixed with twenty or thirty gallons of water. The iodide of potassium, as a medicine, converts the lead into a more soluble form, which can be taken up by the blood. Melsens believed the lead to be in actual combination with the tissues in an insoluble state, and that by the iodine it became liberated, and hence carried off. M. Bricheteau praises brucine in persistent paralysis of the smaller joints. In those instances in which constipation continues troublesome, M. Malherbe is convinced of the value of belladonna internally. Galvanism and electricity are the best stimulants which can be brought

to bear on the atrophied nerves. Their use, however, should be steadily persevered in, and in repeated applications, rather than for long periods at one time. Gendrin recommended to operatives in lead mines and manufactories, lemonade as he termed it, as a prophylactic. This was a drachm or two of sulphuric acid in a pint of water sweetened to make it agreeable.

XLVII.

POISONING BY SULPHURIC ACID.

A DOMESTIC servant, aged forty, single, was brought into the hospital at three o'clock in the afternoon. It was reported that, about half an hour previously, she had been found by one of her fellow-servants screaming with pain; and it was at once ascertained that she had, accidentally or otherwise, taken poison. Her stained and discoloured dress showed the poison to be one of the mineral acids. The medical attendant of the family was first sent for; and this gentleman administered the antidote immediately. When she came to the Hospital, she was very sick, and vomited repeatedly. The countenance was pale and sunken, the skin clammy and cold, and the pulse barely perceptible. Antidotes were again administered; but there was some difficulty in making the patient swallow them. She lay on the floor, and at short intervals screamed in dreadful agony. She referred her greatest tortures to the stomach and abdomen. The eyes were mostly closed; when she opened them, which she occasionally did when interrogated, the pupils were seen small and piercing. The mouth, lips, and throat, on being examined, showed the mucous membrane to be of pearly white. She was put into bed, covered up with blankets; hot bottles were applied to the feet, which had become cold, and stimulant enemata administered. The sickness and vomiting became less urgent, but there was no remission of her agony. The feet and legs, and the surface generally, became still colder. She frequently placed her hands on the stomach, and screamed in a piteous manner. She complained of thirst, and some tough mucus formed in her mouth. She gradually sank, three hours after taking the poison; and the mental faculties were clear to within a few minutes of her decease.

The house-surgeon made an examination thirty-eight hours after death. There was no emaciation, nor any superficial mark, with the exception of a rusty drab-coloured patch, of the size of the palm of the hand, under the left mamma, which had evidently been produced by the acid, as the dress corresponding with the patch was stained and discoloured with the poison. The texture of this stained mark on the dress was rendered more lacerable, and its lines of extent were clearly delineated. The thoracic organs were healthy, with the exception of the heart, which was large and flabby, and,

when removed, it did not maintain the normal configuration. Its cavities and the large vessels were filled with dark fluid gore. On carrying a free incision down the mesial line, and fully opening the abdomen, all the organs brought into view were of a darkish brown charred appearance. A considerable quantity of black-brown grumous fluid, which contained bloody coagula, was found in the abdominal cavity; this fluid, on being tested, was intensely acid. The omentum was shrivelled and contracted, and in some parts a pulpy mass. The entire surface of the parietal peritoneum was of a burnt brownish black colour. On removing the liver, its surface, more especially its convex surface, was of a dirtyish drab; and, on making sections of the organ, the parenchyma was discovered to have been acted upon by the acid to the depth of two or three lines, which extent of its substance was rendered quite pale, and clearly defined; and this chemically altered part of its structure resembled a cortical covering or a thick pyogenic membrane. The general hepatic tissue was less resistant to pressure than normal. At the large curvature of the stomach was observed a long ragged opening three inches in length, through which a great portion of the contents of the organ had been poured into the peritoneal cavity. It seemed as if some of the gastric wall had been absolutely dissolved. The edges of this opening were thinned, corroded, and extremely tender to the touch. The mucous coat was dark blackish-brown, of the same colour as the small quantity of grumous fluid which it still contained, and which, in large amount, had been poured out amongst the abdominal organs. The duodenum was small and contracted; and its internal surface was black and charred, and resembled the mucous lining of the stomach. The œsophagus was diminished in diameter, its passage much narrowed; and the organ felt leathery and indurated. Its internal surface was greyish-white, and the membrane readily rubbed off under the fingers. In some parts of its course, it looked as if it had been parboiled. The spleen was small. The pancreas was shrivelled up to half its size. The ileum and colon, on being carefully washed, were vascular and ramified. The kidneys, uterus, and other organs presented no notable characteristics.

From testimony elicited at the inquest, it was ascertained that the deceased had drunk five ounces of a fluid, one half of which was the oil of vitriol of commerce, the other half water. Being thus diluted, it is probable that a larger quantity of the poison passed into the stomach than would have been the case if the concentrated acid had been taken. The pure acid instantly produces such destruction and corrugation of the passage, that a large quantity does not readily pass down the gullet. A great majority of the cases of poisoning by the mineral acids are by vitriolic acid, because it can be obtained without suspicion, because it is cheap, and because it is used for a variety of domestic and manufacturing purposes. Of seventy-seven recorded cases of poisoning by mineral acids, no fewer than seventy-three were by sulphuric acid. The more prominent symptoms in

the case now given were such as are commonly seen in examples of poisoning by this agent. The effect had doubtless been momentary. Orfila gives the case of a man whose death was almost immediate. The great splanchnic nerves are at once impressed by the poison. Vomitings, agonizing pain, pale face, cold skin, and small feeble pulse, indicated the terrible and speedy effect upon the system. The stainings of the dress and the yellowish-brown patch on the skin were important medico-legal facts to be noted. The prostrate manner in which she lay on the floor, and the evident loss of locomotive power, are characteristic of the effects of this deadly fluid. The heart's action had at once become subdued; and such diminished force of the circulatory system was followed by manifest and sudden decline of temperature. The fatal issue is more frequently at the expiration of fifteen or twenty hours; but this will depend very much on the quantity of acid which passes into the stomach, and on the vital powers of the patient. In an instance like the one recorded, in which the parietes of the stomach were dissolved, and the agent effused into the abdominal cavity, the great shock could not fail of soon being fatal. Pereira and other writers mention the fact of the mental faculties remaining uninfluenced almost to the close. The end is proximately cardial; hence the clearness of the mind.

XLVIII.

POISONING BY BURNETT'S DISINFECTING FLUID.

DR. JOHNSON, of this town, was hastily summoned, early in the morning of May 23rd, to a neighbouring hamlet to see a lady whom the messenger reported to have "taken some poison by mistake." He reached the patient's house at five minutes to six o'clock, and found that three parts of a wine-glassful of Burnett's disinfectant had been swallowed, instead of Dinneford's fluid magnesia. The lady was twenty-one years of age, and had been confined of her first child about six weeks previously. Castor oil had been given before Dr. Johnson's arrival, and he ascertained that an interval of twenty minutes had elapsed between the taking of the poison and the administration of the oil. When he first saw her she was violently and continually vomiting, the matter ejected being a muco-biliary fluid. The countenance was dusky and anxious; pulse quick and fluttering; surface bedewed with a cold, clammy perspiration; and she complained of excessive pain at the epigastrium. Without a moment's loss of time he administered a quart of new milk, in which were mixed six beaten-up eggs; this being followed by copious draughts of warm salt-and-water, diluted lime-water, and salad oil, after which she freely vomited. The extreme danger of the case was obvious. I was sent for, and was there by seven o'clock. When I entered the room she was vomiting, and complaining of a hot burning pain along the course of the œsophagus and at the pit of the stomach. The skin was moist; pupils small; pulse 130, feeble; livid expression of face; no paralysis of upper or inferior extremities, but much general prostration. She lay on her back low down in bed, and was averse to being moved. A thick fluid, consisting of the white of eggs, the solution of gum arabic, and new milk, was given. Vomiting ensued, but the burning pain was relieved, and twenty drops of laudanum were given, but not retained; then powdered opium in sugar was placed upon the tongue, which a return of the vomiting washed out of the mouth. An opiate suppository was now administered; and a large linseed poultice to be applied to the throat and neck, which was followed by much comfort. There had been two watery stools. With the exception

of a small pearly patch, about the size of a horse bean, at the posterior part of the pharynx, there was no trace, on lips, mouth, or fauces, of the escharotic. Strong beef tea, thickened with isinglass and American corn flour to which a little brandy was added, was given at intervals. I met Dr. Johnson again at 8 P.M. Sickness subdued; less pain; great thirst; had little sleep. Expressed herself as being better. Allowed ice and orangeade. Another suppository to be given at 10 P.M.

May 24th.—Had slept badly during the night; epigastric pain not urgent, but she had complained of pains at the shoulders and back of neck, of a spasmodic character. Countenance calmer and more natural; voice clearer; pupils mobile; tongue clean and moist; pulse 134, of better volume. She still lay on her back. Sickness had not returned, except after having taken some warm tea. It was decided that a mixture should be given, composed of the compound gum tragacanth powder, tincture of hops, and tincture of henbane; beef-tea and brandy at short intervals. Nourishing injections per anum were discussed; but the rectum was so extremely irritable, as well as the lower bowel—as evinced by the frequent watery evacuations—that this mode of treatment was not had recourse to. She became gradually worse and died at 11 P.M.

The Times gave the particulars of another case of poisoning by this agent, which occurred at Croydon. A girl, named Evans, seventeen years of age, drank half a wineglassful of the fluid at five o'clock, and died at ten minutes before seven. The medical attendant did not arrive before death. His testimony went to show that frothy mucus was coming from the mouth, the legs were drawn up in a cramped position, the hands were natural, and the pupils were dilated. A woman at Hastings drank a fatal dose of this fluid, which she, too, had taken in mistake for fluid magnesia, the particulars of which were given in one of the local newspapers. A messenger went in all speed to Dr. Blakiston, and that gentleman ordered milk to be instantly drank, which she vomited. Milk was given at intervals for two hours. Some blood appeared amongst the injections. After a while, ice and opium were prescribed. This treatment was pursued, and she rapidly improved during the succeeding ten days. She lived a few weeks; but gradually became weaker, and at length she expired. A post-mortem was made; and at the inquest Dr. Blakiston said there was thickening of the coats of the stomach, and almost total closure of the stomach.

This powerful antiseptic is a solution of the chloride of zinc, and has a specific gravity of 2.0. Each fluid drachm, according to Pereira, contains 25 grs. of zinc; hence, in this case, the deceased must have taken what was equivalent to 150 grs. of the salt. As a deodorizer, its action depends upon its capability of decomposing hydrosulphuret of ammonia. It is not considered to have much power in the decomposition of sulphuretted hydrogen.

Taylor describes the immediate symptoms as those of destruction of the mucous membrane of the mouth, throat, gullet, and stomach; frothing of the mouth, general lividity, giddiness, and dimness of sight; sometimes with purging as well as vomiting. Hassall reported an instance in which there was no appearance of corrosion of the mouth or on the lips. In another illustration, that of a child, given by Letheby, the lips were swollen, and their inner surface and the lining membrane of the mouth presented an opaque white appearance, as if they had been acted upon by some caustic substance; and the autopsy showed the lining membrane of the lips, mouth, fauces, and œsophagus to be of an opaque white colour, the stomach being hard and leathery, its mucous membrane corrugated, and of a dull leaden hue. In the three illustrations now recorded, in all the vomiting supervened immediately; hence it is fair to presume that the greater part of the fluid would be ejected; but with an agent so powerfully corrosive it would almost instantly produce destruction of the mucous coat. In all the cases which I can find published, the great shock at once imparted to the nervous system is prominently mentioned. The great plexuses of the sympathetic chain are primarily depressed, and organic life is potently acted upon. The superficial and deep cardiac plexuses receive filaments from the pneumogastric; hence the functions of the heart are thus influenced, and the phenomena of death are chiefly characterized by cardiac depression, which, in a secondary manner, impairs the functions of the brain. For it was long ago shown by the experiments of Bichat, that the integrity of the functions of the brain is not only dependent upon mere motion, but on the *sum* also of the motions communicated; hence mitigated cardiac action is followed by diminution of force in the great nervous centres. Again, in addition to the irritative sympathies of this class of poisons, by greater or less absorption, there is blood contamination. The poison having been transferred by the lacteal absorbents, or the lymphatics, or the capillaries or veins, according to the part or parts subjected to the poison, the entire nervous system readily participates in the morbid condition thus instituted. By experiments upon the lower animals, the chloride of zinc has been detected in the blood of the heart, in the various tissues, and in the urine.

With regard to the treatment of these cases, the intense caustic qualities of the poison generally produce irreparable destruction before any antidote can be administered. Alkaline demulcents are the best remedies. This patient was naturally of delicate conformation, and from the first we were impressed with the desirableness of supporting the strength. Had nutritive enemata been admissible, they were fully indicated, for the pulse at once became weak and compressible. Letheby made a series of experiments with the poison, and found that it readily passes

into the circulation, producing quick pulse and respiration, feebleness and paralysis of the legs, dilated pupils, coldness of the surface, and coma. The opiates in this and Dr. Blakiston's case were of service. Stimulants in the former were indispensable. In those instances in which the first ill-effects do not produce death, the disorganization and mechanical difficulties which ensue give rise to a sure but gradual declension of the vital power. Dr. Markham related a case which proved fatal after ten weeks, in the person of a woman aged forty-six, who only took half a wineglassful. The post-mortem showed the pyloric orifice to be so constricted as to only admit a crow-quill, there being no other sign of disease. Stricture of the œsophagus might, in like manner, destroy by absolute starvation. Therefore, in poisoning by the agent in question, even when the first and acute symptoms are tided over, the prognosis must needs remain still unfavourable.

XLIX.

A THORN IN THE FLESH.

It is not usual for medical men to be the describers of their own complaints; I will, however, now narrate the particulars of a long and tedious illness, the conditions and progress of which may be read with some interest. In May, many years ago, I began to experience an aching pain at the lower part of the right thigh, two or three inches above the inner condyle. Being at that time compelled to take an unusual amount of walking exercise, I attributed this pain to some twist or strain which might have been sustained and forgotten. A few days' rest gave relief, and I thought little more of my lameness. A long walk again brought it on, and on examination I discovered some enlargement as if in the sulcus between the vastus internus and the gracilis. Over this prominence the skin had assumed a slight blush. Iodine was applied, rest again had recourse to, but little relief was obtained, and the pain and lameness increased. A boggy swelling came on above the knee at the inner side of the limb. In June I became worse, and my professional duties were performed with much inconvenience. I consulted Sir Benjamin Brodie, who recommended bandaging with vulcanized adhesive strapping, to encircle the lower part of the limb. This plan was most unsuited, as the heat, pain, and swelling greatly increased. When Sir Benjamin saw me again he ordered the entire removal of the elastic bandages, and the immediate application of a dozen leeches, to be followed up by fomentations, and afterwards cold lotions, and a general antiphlogistic regimen. It was requisite to remain several days in bed, and for two or three weeks to give entire rest to the limb. This mode of procedure gave considerable relief, and the venture was made to resume walking; but the resumption of exercise soon induced a return of the described symptoms. There was then pain from the ankle to the groin, and Sir Benjamin gave it as his opinion that the saphena vein was cordy and inflamed along its entire course, and that to such condition of this vessel was due the swelling above the knee. Leeches and the same kind of antiphlogistic measures were again adopted. Several of my medical friends made friendly calls, and the opinions as to the real nature of the affection were varied and contradictory.

I resolved to place myself under the care of *one* adviser, and I

called on Mr. Travers, who said he had known cases of an analogous nature, where inflammation of the muscles had been produced at that part, in sportsmen and others, who were accustomed to be many hours on horseback ; and he instanced two cases, where from pressure against the saddle, not only inflammation, but suppuration had been the consequence. He conceived that from a sudden twist there might have been some laceration, and, finally, a small secretion of matter in the deeper muscles. The swelling and pain having abated, a mercurial plaster and a moderately applied bandage were employed. In the latter end of August there was sufficient improvement to enable me to go to the country for some weeks ; and on returning the general health was quite restored ; but the induration spoken of and the pain in walking still obtained. Driving could be borne, and the hope was entertained that the affection would at length with care wear off. In the middle of October, after sudden exertion, all my troubles came back again. On the morning following I could not walk a hundred yards without pain. Three blisters were in succession applied, and absolute rest was again observed. The remedies which had during the preceding four months been used had, it was too evident, been tried in vain. On the 10th of November I was once more in bed, and worse, instead of being improved. On the 18th of the last named month, Mr. Travers again made an examination, and came to the conclusion that the only alternative remaining was to cut down into the part, in the hope of some light being thrown on that which otherwise was so difficult to understand. An incision was made, and the deeper strata of muscles examined. On scratching open with the point of the scalpel a distended bursa, a dram of slate-coloured fluid welled out of it. It was thought that this fluid being bound down by the underlying fascia would be sufficient to give rise to irritation of the periosteal covering of the femur, and inflame the adjacent white textures. The deep muscular tissue looked dark and congested, of a dirtyish red, evidencing the colour observed in chronic myolitis. The orifice was kept patulous by means of lint and continued poultices. After the operation the pain was somewhat less ; in the course of a couple of weeks, however, the whole of the fascia lata of the thigh had become inflamed ; the wound not looking healthy caustic was freely applied ; and as the pulse was soft and quick quinine was prescribed, and a generous diet was ordered with three or four glasses of port wine daily. There was now considerable general debility. The pain in the limb was much augmented ; the discharge from the wound was in great amount, there were copious night sweats ; the appetite was impaired, and it was with difficulty that I could get out of my bed without assistance. The physical signs of the chest were normal, with the exception of some hyperventricular murmur, and some increase of cardiac action. I remained entirely in bed.

Mr. Travers became anxious as to the result. The whole of the inner condyle was so tender as to render the slightest touch painful,

and every day showed the emaciation more marked. My distinguished and most kind medical adviser, who watched and tended my case with a sort of parental solicitude which I shall never cease with gratitude to remember, spoke of the probable necessity of the removal of the limb, advised the total relinquishment of my practice, and a quiet sojourn at Brighton. Fully comprehending the gravity of my position, I consented to carry out this advice, and without delay preparations were made to take the journey, and to abandon all professional cares. When my servant was dressing the wound on the morning of the 8th of January following, he observed a small dark, hard point emerging, not from the surface of the wound, but to one side of it, and through the healthy skin. I placed my finger upon it, and it felt a resistive, sharp body. He gave me a pair of forceps, and, to my consternation, I withdrew a piece of blackthorn exactly one inch and a half long! The bark had gone, and this foreign substance was quite smooth. It now quickly occurred to me that it had penetrated my thigh so long as five years before, when my horse fell in leaping a hedge. I was then not unseated, but received some injury above the right knee. Riding home after the accident, I could with difficulty dismount. There were pain and swelling at the part; leeches and fomentations were employed, and I was confined to bed and the sofa for about three weeks. From that time I was little inconvenienced. After long walks or any unusual exertion there were occasionally some tenderness and swelling. Having had acute rheumatism, these symptoms were merely regarded as of rheumatic character. The cause of a long and weary illness and much suffering having been discovered, I felt pretty confident that the change to the sea would be followed by a speedy recovery. Such, however, was not as I had anticipated. From long suffering, sleepless nights, and great emaciation the system had received a shock which was not so speedily thrown off. The languor and debility were persistent. The wound entirely closed, and my progress then became more rapid. But the inflammation, which had extended to the knee joint, had produced some contraction. I could not fully extend the leg, and months passed over before it could be normally extended. The recital of this case shows how important it is that the presence of a foreign body should, if possible, be detected; and that the implication of so large a joint as that of the knee may be followed by serious symptoms. In a weak and unhealthy constitution the irritation set up might have given rise to some other malady, which would have ended fatally. The lungs or kidneys might have taken on morbid changes, and the general strength have become undermined.

L.

ADVANCED AND PRESENT MEDICINE.

IN this article a brief advertence will be made to that more fundamental and decisive knowledge pertaining to the phenomena of morbid processes; to the more direct, definite, and correcter treatment of diseases; and certain other advancements which during recent years have followed the able and zealous inquiries of many distinguished cultivators of medical science in this and other countries. By a reference to some of these improvements and discoveries, it cannot be otherwise than acknowledged that much valuable progress and true gain have been accomplished which will be available and permanent, and thus confer a broadly disseminated and lasting benefit.

It has been, and truly, said that Cullen did for medicine what Newton did for astronomy. He reduced it to order and a system. He culled from generalities, vague speculations, and transmitted empiricisms, materials out of which he reared the superstructure of a science. He saw that, in addition to a close observance of morbid phenomena, to arrange and classify diseases would confer great aid in the prosecution of their more successful study. He conceived, and correctly, that many ancient dogmas and much of false philosophy, which had trammelled thought and fettered physic, ought to be discarded. His clearer conceptions, and the method which he propounded for a long period in this and other countries, found acceptance; and to his genius our art lies under an enduring obligation. If, however, we take a retrospect over the last quarter of a century, it becomes obvious that philosophic experiment, wider observation, and real discovery, have tended in no slight degree to break down the Cullenian classification, and they have shown that his nosological arrangement was far too defined and absolute. Whoever will compare the nosology published by the Royal College of Physicians with the nosology of Cullen, will at once be impressed with the truth of this remark. They will then see that his divisions and distinctions erred in the way of separateness, that his definitions were too nicely drawn, and that symptoms were erroneously put down as primary conditions and essential differences. It is the acknowledgment of explicable or the presumption of occult correlation between morbid processes, which constitutes one main feature in that change

of thought which distinguishes modern medicine from the reasonings and deductions of the older physicians; and it is indisputable, that to hold fast to this principle in our clinical studies is of paramount importance. Indeed, in the aim at furtherance in knowledge in all of the other physical sciences, to become better acquainted with fundamental causes is to give a correcter notion of the more manifest phenomena; and, without such knowledge, inference is then mere empiricism. If, for instance, the attempt were made in any way to illustrate the definition of disease given by Fernelius—"Morbus est effectus contra naturam corpori insidens"—such would be very imperfectly achieved by the mere pointing out of objective symptoms, as the true explanation would imply change of structure and perversion of function. In thus incidentally speaking of symptoms, it may be remarked, that the better and more accurate employment of this term really constitutes one example of that progress in medicine.

Physiological pathology has greatly shown, and is showing more and more, that diseases are not those individualisms, those distinct material entities, which the older authors and systematic writers had led their readers to suppose; and when diseases are now, in more strictness of language, defined to consist of tissue-change and perverted function, the symptoms by no means stand apart from the complex alterations going on in the organism; and, as it has been observed, the once more prevalent notion of disease being one thing and symptoms another for a long time opposed the advance of pathology. Symptoms are the appreciable parts or facts of integral disease; and we now, for the useful purpose of increased precision, speak of *physical signs*, qualities best observable from without, which in reality are, however, symptoms under another name. Amidst these new views, the thing pneumonia means much beyond that which the term implied a generation ago; it is something more than structure-change. We hardly ever now speak of it as an idiopathic affection; and, when it occurs, we seek for some explanation of its presence in certain more diffuse and fundamental mutations in the system. We regard it as intercurrent or sequential, rather than as a primary lesion; and, according to the objective symptoms, we ask ourselves if it be the outcome of an antecedent cardiac, tubercular, or renal cause; or whether it be the complication of a foregoing and an attendant pyrexia. And our treatment becomes modified according to the decision at which we arrive. The old notion which once mainly possessed the physician's mind, of the expediency to subdue and expel from the body this entity, this something of a material nature, which was deemed more or less substantive, or coming externally into, or engrafted on, the system, was an idea of the past; nor can it ever hold a place again in the more recondite reasonings of scientific men. With the truer knowledge of pneumonia, in all that pertains to its essential qualities, it is not now by any means regarded with those apprehensions with which once it was con-

templated. In the example of a still more familiar affection, if we take whooping-cough, comparatively, the cough, spasmodic and distressing though it be, is but a subordinate characteristic in the course of the complaint. The name implies, as we now know, a good deal more than by it is inferred. It really means the absorption of a *materies morbi* of zymotic qualities. In 1867 Poulet discovered in the mucus of whooping-cough a specific microscopic organism. Jansen also made similar examinations, and found bacteria-like animalcules, which were the *chilomona sparamecium* of Ehrenberg. The effect of such cause is a potential influence on the medulla oblongata and the pneumogastric nerve, and in morbid sequence may eventuate pulmonary congestion, bronchitis, pneumonia, emphysema, and sometimes convulsions and hydrocephalus. To take one more illustration: formerly, there was much of oneness and distinctness ordinarily entertained in the conception of acute peritonitis. Types of its idiopathic character were broadly admitted; and I think, in some exceptional cases, such admission cannot be disallowed. But many leading authorities of the present day will hear of no such thing, as they regard acute inflammation of the peritoneum as being always associated with other and foregoing structural change. In the article on Peritonitis in this volume, I have more fully discussed this subject, but without concurrence in a doctrine so unexceptional and absolute. The term idiopathic, in most inflammatory affections, is now doubtless to be used in limited, if not in very dubious manner. Names in medicine are but arbitrary distinctions, and any nomenclature must vary with the acceptance of new facts.

From what has been said, it is evident that the interrelation which subsists between the processes of morbid action is far greater than once was imagined. The thoroughness of our knowledge relative to organs and tissues, in such as pertains to their intimate formation and vital endowments, as compared with such attainments in the past; the new aids which have been brought to bear on the various modes of investigation, and the multitude of observers who follow up any so-called discovery, have tended to prove how effects were formerly too frequently interpreted as primary conditions. And this profounder examination and more inductive method of reasoning have exerted a marked and beneficial effect upon practice. We now look upon dropsy as a symptom, as one integral part entering into the sum of changes, structural and functional, during life, and not as a substantive complaint, any more than cough in pleurisy and dyspnoea in pneumonia are substantive complaints. According to the cavity or tissue in which fluid is effused, we elect the right class of therapeutic agents. We do *not* give diuretics in renal anasarca, as it was once the custom—we act upon the skin and the radicles of the portal vein; but we *do* give diuretics, and freely, when there is only hepatic disease, and such is evidently cirrhosis. This ability thus to judge and thus to act is the kind of

improvement towards which our main efforts are, or ought to be, directed. It is progress in the right line, because it is progress which tends to certitude as the result of remedial measures. The want of certitude as the effect of our resources has been the lament of physicians in all ages. From the ancients to our own day, there has been, and it is feared will long continue to be, more or less of guessing in physic. "I have reached the end of life," said one of the older physicians, "and am tired of guessing."

Pathology, or that knowledge of morbid changes, and the mode in which such changes occur in structure and function during life, as evidenced by examination after death, has accomplished great things. The facts which have emanated from its more careful and extended prosecution have thrown great light upon and vastly improved diagnosis; and, as all treatment becomes immediately referrible to that process of thought whereby we decide on the nature and working of diseased conditions, thus our practice has become more perfected. Perhaps the greatest achievement in pathology during the present century was that made by Bright relative to renal maladies. This discovery opened out a new territory, and heralded the way to marked and manifest improvements. The new region he made known has been surveyed and mapped out by many successors, and much, such as our acquaintance with the gouty and syphilitic conditions of the kidney, has been added to what Bright first revealed. The presence of albumen points with index finger to the diverging roads of many pathologic changes. If, by the process of exclusion, we find it is not owing to mechanical obstruction, the result of cardiac or pulmonary disease, we assign to it a humoral origin—a morbid condition of the blood. It is now admitted that the different forms of kidney-lesion come from a conservative effort in the system to free itself from the noxious materials diffused in the circulatory fluids. Their irritant qualities give rise to tissue-changes. We are aware also how retained urinary excreta produce inflammation of the serous membranes, and that uræmia often proves fatal. Again, as one more example of many consequent on this new knowledge, it may be said that cardiac complaints have received much elucidation. Blood thus poisoned gives rise to obstruction in the minute vessels and capillaries. The heart labours to overcome such obstruction. Excess of function has an hypertrophic tendency, and more especially in the left ventricle. But the result does not stop at mere hypertrophy: vital nutrition is impaired; tissue-metamorphosis eventuates, and thus molecular perversion supplants the sarcous element and substitutes olein. In other words, there is fatty degeneration; and then follow dilatation of the cavities, more especially of the right side, and visceral congestion with effusive products.

Our better acquaintance with the retrograde metamorphosis of the tissues is a prominent feature in the recent progress of pathology. Indeed, it may be said that a clearer conception of these degenerations can hardly, in a practical point of view, be over-estimated.

To recognise these gradual mutations of structure, such as the granular, the fatty, the albuminoid, and the calcareous; to know that they thicken, diminish elasticity, and render brittle organs and structures concerned in vital processes, is to prepare us for sequential occurrences, and to confer knowledge of paramount clinical importance. To know in the young a tendency to *ramollissement* in the central commissures; and in those of advancing years, and the aged, to detect fatty waste in the cardiac ventricles, or to shrewdly suspect stiffening of the cerebral arteries, is to put us in possession of such information as may confer some power, at least, in deferring other contingencies. We can then comprehend the correlation between a soft heart and apoplexy, and between the narrowed calibre of some artery in the brain, and the circumscribed decay of white structure. The kind of knowledge now indicated, and which has latterly so overgrown former attainments, has notably modified treatment. Practice, once strangely termed heroic, has passed into the domain of history; the old notion of a phlogiston has all but departed, and hence we hear less of antiphlogistics; we bear in mind that the sum total of disease means perverted function with correlated nutrition change, and that vice, in these interstitial processes, is from diminished rather than from excessive vitalism, and thus our remedial endeavours have become mainly supporting and sustaining, as contradistinguished from the hypotheses and convictions of a passing age. Next in importance may be named the discovery of Kirkes and Virchow. Embolism and thrombosis have solved problems which previously had received very different kinds of solution. They have explained morbid actions which before were wrongly interpreted. A piece of lymph is swept afar in the current of the circulation, and plugs a distant vessel, it may be in the spleen, the liver, the kidney, or the brain. Disease, by this abrupt cutting off of nutrient blood-supply, follows, which used to be referred to the doctrine of crisis. Those pyramidal patches in the solid viscera which are preceded by congestion, the consequence of blockage, and that pass into the suppurative state, and which Rokitansky explains on the dyscrasial theory, are doubtless caused by embola; and the purulent deposits spoken of by Rayer, in his great work on the kidneys, are now referrible to a like cause. Nothing amongst our recent attainments, relative to pathologic and chemic changes in dead parts, is more interesting than embola and thromboses.

With regard to inflammation, a condition with which, both as physicians and surgeons, we have much concern, no great mutation of views has latterly obtained. Cellular pathologists have long told, and still tell us, that its leading phenomena are those of abnormal nutrition. The doctrines held respecting it may be looked upon as a sort of compromise between solidism and the humoral theories. From a truer conception of its essential nature has come great gain. The object now is to favour plastic exudation, and not to lower vitalism, and thus degrade effusive materials.

With a more demonstrable and sounder pathology is a clearer recognition of those eliminative efforts in the system, which may be deemed conservative. To favour, not to subdue and check their excess, is generally the aim of our remedies. We now are aware that blood-poisoning is frequently the etiological explanation of many morbid phenomena. In diabetes, the elimination of sugar is protective from worse results. The flow of bile through the ductus communis, from some temporary or permanent cause, being arrested, the secretion is revulsed into the circulation, when the urine carries out that which would be harmful, if retained. In gout, the giving-off of uric acid, and the deposit of urate of soda, are salutary. Malaria, or the specific poisons of typhus, enteric, or relapsing fever, are contracted when the bowels and skin form the great outlets whereby nature essays to cast out the noxious agents. The alvine evacuations in cholera, it is now held, are to be favoured rather than restrained, as by these outpourings the system is eliminatively relieved—a doctrine which has become widely accepted. In variola, the pustular deposits on the surface are a means whereby nature frees the blood from materials which could not innocuously be retained in the circulation. And of the other exanthems the same observation holds good. By this mode of reasoning, the majority of chronic cutaneous affections may be accounted for; because it is now allowed that certain alterations in the composition of the blood produce disturbances in the investments of the body, from modified blood-distribution, consequent on changes in the nerve-centres, the more apparent secretional products being essentially eliminative; and consequently dermatologists, in these days, look deeper into the pathology of skin-diseases than the epidermis and the derma. This spontaneously curative effort of elimination may also occur without the expulsion of morbid products from the system. For instance, in dropsies effusion is determined into the great cavities of the chest or the abdomen, or, it may be, into the pericardium, or the areolar tissue, when local vascularities become relieved, or, perhaps, saved from rupture, and the more continued congestive and inflammatory states are benefited. We then mark how such event mitigates the more urgent and distressing symptoms of an acute stage. For example, in pericarditis and endocarditis, when the heart labours and the pulse intermits, with the outcome of the fluid into the pericardium follow lessened præcordial impulse and intermittence, and often an expression on the part of the patient as being more comfortable. In pleurisy and in peritonitis, the advent of effusion, sometimes with much suddenness, cuts short the more prominent characteristics of the inflammatory phenomena. Various other illustrations of the salutary tendency of this eliminative secretion might be cited.

Another great addition has been made to pathology by our being far more conversant with the affections respectively known as pyæmia, septicæmia, and ichorrhæmia. It is now allowed that the first named may have its origin in hospitalism, and from without,

and that it may also be caused within the organism. From recent and extended discussions, it is also clear that this affection is by no means confined to hospitals, as it was once assumed, but that it may, and does, occur in the most healthily situated houses in the country, remote from deleterious gases, and in the purest atmosphere. We now acknowledge the difference between pyæmic and infective inflammation and septic action; and pyæmic disease can hardly be said to obtain without more or less of septicæmia as the concomitant, but the septic action is far feebler and less irritative. Most pathologists now believe that the transference of pyæmic products from one part to another is by means of the lymphatic system or of the veins. Some have lately spoken of idiopathic pyæmia. In such cases, most probably the local starting-point, or focus, has not been discovered. There still remains much that is uncertain relative to these affections; yet we can now anticipate a train of diseased processes which formerly were much less suspected, and, when they did occur, were far less understood.

No class of diseases is more familiarly, more thoroughly known, than diseases of the chest. The great work of Laennec inaugurated a new era in thoracic pathology. It conferred a positiveness in diagnosis which can scarcely in such full measure be said to obtain in judging of any other order of ailments. Nor can it be held, though multitudes of observers have availed themselves of Laennec's discovery, that much of real practical significance has been done beyond what he accomplished. Prior to the recognition of the physical signs, capillary bronchitis and pulmonary collapse could not be distinguished from pneumonia; cardiac diseases were vaguely referred to ossification; effusions could only be decided upon by the Hippocratic symptom of succussion; and aneurisms could alone be guessed at by the more general and objective symptoms. The extent and degree of pneumonia can now be decided upon with not a little certainty; and its treatment is more successful from a more rational pathology. Those intercurrent forms which constitute episodes in the graver epic of a wider lying general or constitutional malady, and with which frequently the pleura becomes locally implicated, can now be detected with much niceness and precision. Accumulated facts have made knowledge which has ceased to be contested. Pericarditis and endocarditis, we believe, never occur but in rheumatism; fibrin on the margin of the valves is looked upon as a deposit, and not an inflammatory exudate, on the valves themselves; hypertrophy now means cerebral or other hæmorrhages, rather than direct injurious influence on the action of the heart itself; extensive binding down of the lung to the costal wall, it is now allowed, may be compatible with lengthened life, and almost with health; and morbid anatomists now admit that considerable pericardial adhesion may eventuate with comparative recovery. The stethoscope has placed the modern physician on a vantage-ground which could in no wise have been hoped for by the older practitioners. They had

not the means of arriving at any correctness in judging of the morbid changes within the thoracic walls. Forty years ago, the average duration of phthisis was about two years. Under improved treatment, it is now estimated at four years. It has also been conceded that, in some cases, the disease admits of positive cure. Though such instances are exceptional, still they are sufficient to inspire us with the hope that with the progressive increase of our knowledge will come greater and greater success in this direction of our endeavours. *Post-mortem* researches teach us that pulmonary cavities, even of considerable dimensions, may contract and heal up, and absolute recovery be the result; indeed, it may be added that such obliteration of these excavations is more usual than in former years was supposed. Our definition of the pathology of phthisis is more exact and defined. We now talk of fibrosis of the lung, a degenerative deposit which bears much resemblance to the amyloid substance; of embolic phthisis, in which are cheesy deposits and disintegrated blood-clots; of bronchial and pneumonic phthisis, characterised by cheesy matter and ulceration of the bronchi, or with exudation into the pulmonary tissue; and of syphilitic phthisis, with gummata allied with the cheesy product. These pathologic distinctions in the description of phthisis render its treatment more successful.

The animated and diffuse debates on tuberculosis have, with other elucidations of its nature, clearly shown the infectious properties of phthisical inflammation. It is now believed by Niemeyer and others that phthisis may follow hæmoptysis without genetic connection between the hæmorrhage and the pneumonic process; and that blood retained in the alveoli gives rise to inflammatory products, which undergo the cheesy change, and that such metamorphosis is followed by tubercle. Grey and yellow tubercles are now shown as being identical; and an intermittent pyrexia or chronic phthisis has latterly been looked upon to denote the absorption of caseous matter. Such are some of our advances relative to this common and justly dreaded disease. The alternation with, or vicarious occurrence of, bronchitis in gout is an important practical advance; and in bronchitic asthma we are more clearly impressed with the implication of the ganglia and the influence of the vaso-motor function. Pleurisy of the idiopathic or primary character is now considered to be far more rare than was formerly supposed; indeed, if we exclude mechanical and physiological causes, primary pleurisy is exceedingly rare. The types of this disease which we so commonly see are rather the complications or sequential conditions of some foregoing visceral affection, or some constitutional malady which has already produced an impress upon the organism. We contemplate its presence very much in the same way as we contemplate the presence of pneumonia, and we try to discover the indications of some antecedent vice in the system. We more greatly suspect its insidious character; we are aware of its not infrequent association with pyæmic infection, with pulmonary

phthisis, with the various forms of renal disease ; and in all cases of pneumonia there is, perhaps, a greater or less degree of pleuritic inflammation of the fibrinogenic type. The competent manner in which we can now diagnose fluid in the cavity of the chest, and elect between trusting to absorption and having recourse to thoracentesis, ranks amongst the greatest improvements in modern medicine. This operation is shown to be followed with little danger. By its timely adoption, as compared with the non-instrumental interference, and the vacillating practice of the past, a large number of lives are now saved. The morbid anatomy of pleuritis with effusion, as well as clinical history, have established the axiomatic rule, that paracentesis thoracis should be had recourse to early, and before the pyogenic membranes become organised, and the lung substance is bound down and compressed beyond the powers of expansion. The discovery of albuminous expectoration following thoracentesis, made by M. Pinault, and which was importantly brought forward at the Academy of Medicine in Paris, as illustrated by the cases narrated by MM. d'Espine, Woillez, Marrotte, Behier, and Terrillon, is a curious addition to pathological acquirements.

Though diagnosis is less certain in lesions of the abdomen than in the chest, still the knowledge of abdominal diseases has been most progressive. The viscera in this cavity being from numerous causes subject to great variation in size, configuration, and position, much difficulty will always be experienced in correctly comprehending the particular maladies which are there to be found. It is now affirmed that no parts in the body have such immunity from disease as the jejunum and the valvulæ conniventes. We have more trustworthy guides for observation on deciding between simple and malignant disease of the stomach. We maintain that acute idiopathic gastritis does not occur in this as it is said to occur in tropical countries. The discovery of *sarcinæ ventriculi* led to the cure of a tiresome stomach complaint. We know that the sulphites of potash and soda destroy these fungi, as certainly as the sulphites and sulphurous acids destroy these vegetable parasites in the skin. Between torpor of the colon and melancholic depression there is intimate relation. Ulceration of the ileum is never seen in any acute disease, except in enteric fever. Ulcerations in the lower third occur in chronic phthisis, but they differ not only in their pathologic characteristics, but in their relation to the axis of the bowel. Cancer we know to be far less frequent in the ileum than in the colon ; and if the pylorus be excepted, it is more prone to be located at the sigmoid flexure than at any other part of the digestive tube. Perforation of the intestinal serous covering is most rare, except in enteric fever. Respecting our recent knowledge of the liver, many facts have been accumulated. It has been ascertained that the hepatic cells perform the function of secreting from the blood a substance named glycogen, which is rapidly transformed into glucose or animal starch ; and that this principle is carried into the heart, thence to be oxidised in the

respiratory process and evolve animal heat. This glycogenic function is a physiological fact of much significance in a practical point of view. In acute or yellow atrophy, it has been discovered that the urine exhibits remarkable changes, as there may be the total disappearance of urea, uric acid, the chlorides, sulphates, and phosphates; and these are replaced by the fibro-albuninous products named leucine and tyrosin. The waxy or amyloid deposit recognised in this organ is considered to be consequent on ulceration of the osseous tissue and long-standing syphilis. Palpation, percussion, and feeling the notches in the free edge, tell us much of splenic enlargement. The latest additions to our information relative to the spleen are chiefly physiological. In the intertrabecular spaces are doubtless first formed the molecules which become developed into blood-corpuscles; and it is believed that in the pulp they also become disintegrated. Such vital processes being there elaborated, it can thus be understood how anæmia and disease of the spleen stand in intimate correlation. In leucocythæmia, that affection which is characterised by excess of colourless corpuscles and diminution of blood-corpuscles, great light has been thrown upon the splenic lesion by which it is accompanied. Excess of fibrine and decrease of coloured corpuscles are the two primary cardinal changes in leucocythæmia. Such are some of the new facts respecting diseases within the abdomen.

In glancing at the nervous system, much in recent years has been done; still, it is undeniable that a great deal of ambiguity remains in diagnosing cerebral affections, because the degree of objective symptoms is frequently by no means the exponent of the degree of morbid action. We are often and correctly guided by physiological phenomena. I recollect a man who had a small osseous formation at the base not larger than a pea, which had produced terrible epileptiform attacks. The philosophic and physiological experiments of Ferrier have conferred much more certitude in the diagnosis of cerebral maladies than was previously known, illustrative of which Dr. Hughes Bennet's case at the Westminster Hospital is a good example. And it is now evident that diseases of the brain will be known with far more exactitude and precision. Schiff has shown that augmented heat produced by activity of the nerve-centres is primarily due to the vaso-motor nerves; and the experiments of Heidenhain, Riegel, and Fick, have solved some interesting problems relative to the extrication of animal heat. In blood-poisoning, we are more impressed with the peripheral irritation which produces phenomena in the great nervous centres. The vaso-motor function renders explicable much which before was ill understood; epilepsy in age we now refer to retrograde metamorphosis of the tissues; and it is generally accepted that this disease, epilepsy, which has an etiology so multifarious, is always primarily caused by anæmia; and when there is muscular atrophy in the young, we refer the wasting to a foregoing brain-change. Again, softening of the cord, we now know, always means more or less of anæsthesia as the accompaniment; and it has

lately been discovered that induration of the cord is followed by regular and rhythmic paralytic action of the voluntary muscles. It is a great and important advance that locomotor ataxy, as Todd and Duchenne were the first to show, ought not to be confounded with paraplegia. Its chief characteristics may be defined as the want of co-ordinating motor power in the lower extremities. We also now are aware that the structural disease is confined to the posterior column of the cord, and very generally to its dorsal portion. Some pathologists believe, and I think clinical observation confirms the opinion, that the excess of cerebro-spinal fluid gravitating into the theca vertebralis, and at a given point producing pressure, may act as a cause. In several cases which have been under my care in the hospital, I have found that long continuance in the horizontal posture has greatly aided remedies. The microscope shows the diseased part to have undergone the fatty change. One of the analogues of locomotor ataxy, and occurring in the brain, is that morbid condition now known as aphasia, or the loss of articulate language. And it is a very curious fact, that its pathological cause is now defined to be blockage of the middle cerebral artery of the left side by an embolon from valvular disease. It may, however, be produced by other causes, as hæmorrhage, tumours, and gummata; indeed, I think it is more frequently the result of specific gumma than is generally allowed. A young man came into the hospital under my care. He was hemiplegic and inarticulate. He had aphasia, agraphia, and was amnesiac. There were proofs of secondary syphilis. He had fifteen-grain doses of the iodide of potassium, and, as he improved, was ordered electro-galvanism. In the course of a few weeks he had made a full recovery. The effects of the syphilitic poison on the nervous system constitute one of the many recent and marked advances in our art.

That contested question, the change of type of disease, at one time received very general acceptance, but the doctrine, in my own humble opinion, never seemed so tenable as many maintained, because the phenomena of disease, like the phenomena of other natural processes, are doubtless based upon fixed and immutable laws; because we have proofs that some acute affections now run their course as they ran it generations ago; and because this change of type, so-called, was too sudden, abrupt, and unexampled in its accession to be reconcilable with the theory of some occult and extrinsic alteration, as being a sufficient causation for those modified views and that reversal of treatment which so rapidly followed the declaration of this dogma. It is clear that epidemics vary in the degree of their intensity, doubtless from differences of physical conditions, if we could but demonstrate them, which enter into their etiological state, which may be either telluric or atmospheric, or both; still, their broad outlines, their characteristic features, remain the same. This new notion became the facile hypothesis which, with little trouble, commended itself for adoption, and which supplied a ready answer to any questioning of novel views. But it never

seemed so philosophic as to warrant the extreme lengths to which the theory put into practice was pursued. Whoever will compare the descriptions of Fracastorius and Cardanus of typhus of the sixteenth century, will at once see how in all essentials they apply to the graver forms of typhus of our own times. The accounts which we have of fever in the seventeenth century by Riverius, Mangetus, Willis, and others, are the accounts of the enteric form which we all now know so well. Ratty was the historian, under another name, of relapsing fever a hundred years before its characteristics and its distinctiveness were more fully described in 1843 and 1844. The records of scarlet fever by Sydenham, and Fothergill's sore throat, are applicable to diseases which we all see daily in our practice; and the course of variola vaccinia is precisely the course which it ran now nearly a century ago. Other arguments might be given to show the invalidity of the uncompromising manner in which change of type theorists insisted upon their creed. It may, however, be observed, that this notion quickly succeeded Bright's discovery, which was about to sweep away many pathological dogmas and theoretical phantasies. The Vienna school had about this time promulgated the doctrine of crasis. Microscopical anatomists and analytic chemists had begun to point out molecular degeneration and secretional abnormalities, the ocular proofs of an impaired vitalism. Such terms as metastasis, idiopathic, dynamic, and sthenic, began to lose their hold on the medical mind; and symptoms heretofore regarded as the expressions of excess of strength were, in more philosophic reasoning, to be looked upon as the evanescent excitations incident to degeneration and debility. Febrile affections, pneumonia, and other acute diseases, were gradually treated with more success, because the treatment was in clearer manner founded on sounder pathology. The large and repeated blood-lettings in fever, which had erroneously been advocated by Welch, Clutterbuck, and Armstrong, from this new knowledge and closer clinical observation, became discarded, and consequently the mortality became diminished.

As additions to our information, reference may be made to our knowledge of cerebro-spinal meningitis, diphtheria, hereditary syphilis, and the great class of microphytic diseases; to the wonderful facts brought to light relative to entozoic affections; to the far better understanding of the complaints of infancy and childhood—the term infantile remittent being really another name for ignorance rather than the expression of correct diagnosis; to the more accurate distinction which we draw between gout and rheumatism; to the fact that lactic acid conveyed into the blood artificially will produce symptoms resembling rheumatism and veritable endocarditis; to our greater acquaintance with those congenic conditions, tuberculosis and strumosis; to the fact that cancer, like tubercle, is a debased organic product: and it would be easy to continue this kind of enumeration.

Confused notions and much ambiguity overshadowed the great

questions involved in the study of continued fever; authorities differed, and how much of doubt and uncertainty as to prominent symptoms were engendered in the mind of the physician! The definitions of the three types of continued fever, which we can now give, and which are of such inestimable worth in a practical point of view, were unknown. With these descriptive accounts of their essential differences, the mists which once obscured the pathology of fever have passed away, and trustworthy landmarks stand out—founded on the bases of truth and fact—as guides to all future times. The cardinal characteristics of each species are now familiarly known. It is curious, but the Hippocratic and Galenic theories have received confirmation in our own day by the researches of Virchow and Traube. It is now acknowledged that, whatever may be the changes which fever-poison primarily exerts on the blood, the first intelligible physiological effects are in the nervous system, and in the sympathetic and vagus in especial. The increased oxidation of nitrogenous tissues, the commensurate evolution of heat, augmented heart's action, and the non-elimination of metamorphosed products, are the great predominating and fundamental changes in fever. These are the forerunners of all other morbid processes, and between the sum of their excess and the degree of perverted secretion there is correspondent relation. Increase of heat is the symptom pathognomonic of pyrexia. In the recognition of specific differences in fever, we are by parity of reasoning compelled to admit that their material causes differ. The character of tissue-change is determined by the character of specific poison. It is the opinion of modern pathologists that the *materies morbi* always invades the organism from without. We now have a vast array of proofs that overcrowding, bad or insufficient food, and mental depression, are the main circumstances which precede epidemics of typhus; that decomposed organic matters produce the enteric form; and that relapsing fever is so apt to follow on the heels of destitution, as to have acquired the synonym of famine-fever. Such are the cognisable, the preventable states, entering into their causation. Those vital and chemical processes which produce combustion of what is called the store-albumen of the blood, mainly give off urea and uric acid; and it is to the retention of these urinary solids that prominent symptoms and intercurrent affections are almost if not wholly owing. It is from these products of metamorphosis that congestion, a low form of inflammation, and uræmia, supervene. Hence, in treatment, to favour elimination is of supreme importance. Before all this new light shone forth, our remedies were prescribed with great dubiousness and much perplexity. We could not anticipate events. We did not know what to expect during the course of the respective species.

By the non-recognition of those types which are so distinct and reverse in their essence and phenomena, fears were then unnecessarily aroused, and dangerous symptoms were sometimes regarded with too little heed. In this our day, we know typhus by its mode of accession,

its rubeoloid rash, the absence of diarrhœa, the grave impress made on the great nervous centres, the drawing-in of the abdomen, and the average date of the crisis. In enteric fever, its slower beginning, the lenticular rose-coloured spots, diarrhœa, tympany, pain and gurgling in the right iliac fossa, the cleaner tongue, and less cerebral disturbance, tell plainly of its nature. The sudden accession, quick pulse, great heat, icteric tendency, the abrupt resolution by diaphoresis when the apyrexial state becomes at once complete, and, in the course of a few days, the repetition of primary symptoms, pronounce the relapsing type. Many years ago, I pointed out the fact that the temperature in relapsing fever may be 107° or 108° Fahr. without the case assuming an alarming form. In typhus and in the enteric species, we contemplate with deep and just anxiety such a high reading of the thermometer. Again, in the two last named types, sudden and powerful diaphoresis is not unfrequently a fatal symptom. In each of these three species, we now not only know great cardinal and distinguishing characteristics during life, what to look for, but changes which we do not expect to discover till after death. In typhus, there is no specific lesion. We do, however, in typhus find brain-atrophy, œdema of the pia mater, and active and passive congestion; but in enteric fever we find specific lesions in the ulceration of the agminate and solitary glands of the ileum, and sometimes sparsely scattered in the colon. In a number of *post-mortem* examinations made on those who had died of relapsing fever, I did not in a single instance find these ulcerations, but always more or less of splenic disease. In typhus we dread cerebral mischief and muscular degeneration enfeebling the heart; in enteric fever, failure of cardiac power from ganglial impression made by the specific poison, intestinal hæmorrhage, and perforation; and in relapsing fever, cholæmic and uræmic poisoning are often associated with the fatal catastrophe. I have shown in the article on Uræmia how the phenomena of this mode of blood contamination may closely resemble those graver symptoms which are liable to be presented in essential typhus. The typhoid state of the specific pyrexia, and the typhoid state from renal disease are sometimes so correspondent that the thermometer can mainly be relied upon to solve the difficulty; and I know of no circumstances in which thermometry, so opportunely, and in such elucidative manner, comes to our aid and decision in diagnosis. During the first week or ten days of the three now acknowledged forms of continued fever the careful noting of the temperature is of the utmost importance in guiding to a correct conclusion.

I may here make some reference to a remarkable extension of our knowledge, which seems to hold out great promises in the future. Until up to a comparatively recent date, the hidden, unknown, and mysterious nature of contagion, was classed with many other enigmas which shroud and obscure the origin and qualities of most physical entities, and pertaining to which explicable solutions cannot be expected. M. Pasteur's philosophic researches

on fermentation and putrefaction heralded the way to those most important discoveries which have lately been, and which are still continued to be, made relative to the true and initiatory causes of infectious diseases. The knowledge which has already been gained is of transcendent, inestimable value, and still gives the hope of our greater and more increasing power in circumscribing and lessening the spread of those affections. It is known as the Germ Theory of contagious complaints, and that *contagia* are really minute living beings which grow and multiply in the body, and that those different microscopical organisms give rise to different diseases—like always producing like. They have been variously named *bacteria*, *bacilli*, *spirilla*, *microbes*, *mycophytes*, *mycozymes*, etc. They are said to be animal and vegetable parasites; within the body they are produced by enormous multiplication; and they are long preserved without the body. They seem to elect different parts, organs, and tissues of the system, and hence are observable special and peculiar symptoms. Virchow says pathological anatomy has been much changed by the discovery of these parasitic organisms. Liebermeister is certain that these *contagia viva* lie at the root of all infectious ailments. They cannot be developed of themselves, outside of the body, but must be within, or carried from without into it. They are by the authorities on this subject regarded as solid particles, and contagium has been called a *particulate*. In addition to having been found in infectious fevers so-called, they have also been discovered in erysipelas, diphtheria, gonorrhœa, and glanders. Septicæmia is now supposed to be caused by a microbe in the economy living without air and a ferment. It is now admitted that pulmonary consumption is contagious, and the little parasite from which it proceeds is of rod-like shape, and named the *bacillus tuberculosis*. They have been seen in the pulmonary cavities; in the softened caseous products thrown out; in abundance in the miliary nodules; in the infiltrated walls of the bronchi, and in the larynx, the intestines, and the lymphatic glands. Such are some of the leading facts and acquisitions which have been arrived at, and are now fully accepted by those authorities who have devoted themselves to patient, careful, and repeated investigations in the study of this most important subject.

With regard to therapeutics and hygienics great and marked advancement has in later years been achieved; diseases are now treated with much greater reference to those more occult and fundamental conditions which give rise to symptoms that are apparent and cognizable; and that routine and the addressing of remedies rather to names, and to what were looked upon as distinct and separate entities, are becoming more and more discarded. The actual and physical states of organs are more correctly and better interpreted; and sounder pathology now confers more certitude and efficiency in prescribing. Formerly theory was held in too much regard, and the respect for custom and long usage often was harmful, and led to

error in the selection of agents employed. The lines drawn were too precise and definite; the thing inflammation was looked upon as a primary and substantive condition, when depletion and antiphlogistics were heroically brought to bear in its hoped-for subjugation or destruction; and when the art of treating disease became much of empiricism, instead of being pursued as a science. The word cure was too much spoken of, and though at the present some diseases are doubtless *cured*, yet this appellation can only with propriety be cited in quite exceptional cases. Our great aim in these days is mainly to guide various maladies to a favourable termination, and to relieve symptoms; and this observation particularly applies to all febrile affections. In those ailments which we know must pass on to a fatal issue, to prolong life and confer comfort are objects to be held sedulously in view. From what has now been briefly advanced, all treatment should be directed under a true appreciation of general pathological conditions. The prophylactics to be considered is to put the patient in a right way of managing his own health; in avoiding causes which might tend to bring on certain attacks; to prevent the diffusion of contagious diseases, and, as far as such can be done, to remove or lessen constitutional tendencies. In the treatment of all complaints, and especially during the course of acute diseases, great attention should be given to regimenal rules and a properly selected diet. In such affections as dyspepsia and in languor and debility such may be of more real benefit than drugs. Stimulants should ever be given with much caution; and in all fevers and diseases of the inflammatory kind they should be administered in measured quantities, and at certain and specified times. In *preventive* measures much of promise is held out to the future. Royalty has begun to take a deep and an earnest interest in the better housing and more healthful homes of the working classes, and many philanthropic and able coadjutors are assisting in the good work. The dens of poverty and squalor, which are often in the figurative and correct language spoken of as the hot-beds of disease, are to be lessened. The small and crowded rooms of the poor in East London, and in the cities and large towns of the empire, where diseases become developed, and from which contagious affections are favoured and diffused, are, in the course of time, to be abolished. Again, another noble and beneficent effort is being made by that benevolent and highly gifted lady Miss Mary Wardell by the establishment of Convalescent Homes, in order to mitigate and circumscribe that terrible disease scarlet-fever. At a large meeting held a few weeks ago at the Mansion-House, under the presidency of the Lord Mayor, there was great consentaneousness of opinion that this grand idea should be broadly supported, and certain advocated that the Government should take up the matter. It was on that occasion stated that in England and Wales 57,433, from the year 1870 to 1879, died from small-pox; but during the same period 173,124 died from scarlet-fever! If these two great

movements so happily begun be fully followed up, there will annually be an enormous diminution of suffering, and an immense saving of human life.

I have endeavoured to concisely indicate some of those great advances which have latterly been accomplished, and which have signally extended the boundaries of medical science; but a vast array of acquisitions of deep interest remain untold. As pertains to preventive medicine, the onward march has been commensurate with any of those kindred subjects which come within our studies. Whatever progress may have been made in any of the physical sciences, the progress in medicine has been equal to that of any. During the last thirty years more has been achieved than in any previous century. A higher standard of education, better clinical teaching, and more thoroughness of acquirement, are telling favourably on the student. Silent workers—and they are many—in the wards, the laboratory, and the study, are evolving great truths, and continually fortifying the busy practitioner with fresh facts of inestimable value. The medical profession is being held in higher and higher estimation. There never was a time in which more zeal, more ability, and more loyalty, were found in its ranks; and there never was an age in which our exalted vocation was pursued with such success as it is pursued in the present day. An enormous accumulation of facts—irrefragable, applicable, priceless facts—has made great stores of new knowledge, which daily is wisely, humanely being brought to bear in enabling us more certainly, more successfully to wage our war against the ravages of disease and death; and this knowledge, which is broadly recognised, solid, immutable, “will remain as the Danube and the Alps remain, because it is founded on the Beautiful and the True!”

INDEX.

A.

Abdomen, large, in puerperal peritonitis, 150.
 Abscess in pancreatitis, 116.
 Abscess of spleen, 71.
 Acephalo-cyst, hydatids, rise from spleen, 45.
 Acute muco-enteritis, 188.
 Acute splenitis, 60; diagnosis in, 61.
 Adhesion of pleura, 277.
 Advanced and present medicine, 784.
 Agglutination of bowels, 203.
 Air, admission of into pleural sac, 290.
 Albuminous expectoration, 296.
 Alveolar cancer of bowels, 228.
 Alvine discharges in enteritis, 186.
 Anæmia quickly comes on in splenic disease, 49.
 Ancient writers on spleen, 50.
 Andral on pus in spleen, 47.
 Aneurism, diffuse, of abdominal aorta, 613.
 Aneurism of left ventricle, 606; etiology and pathology, 609.
 Aneurism, subclavian, 594; spontaneous and accidental, 597; fibrous tunic mostly affected, 597; treatment, 603.
 Aortic aneurism, 8.
 Aphthous secretion in enteritis, 185.
 Apoplexy, 242; premonitory symptoms, 242; post-mortem appearances, 243; fatty decay, 245; treatment, 247.
 Applications of cold in peritonitis, 168.
 Aspirator, 294.
 Atrophy of pancreas, 117.
 Atrophy, spleen of, 86.
 Antigenetic origin of typhoid fever, 411.
 Average of perforation in peritonitis, 148.

B.

Billard, congenital enteritis in, 197.
 Billroth on changes of spleen in typhus, 47.
 Bladder, exfoliation of, 654.
 Black substances in spleen, 50.
 Bladder, urinary, chronic ulceration of with hæmorrhage, 651.
 Black vomit, relapsing fever in, 524.

Bowel, all coats of diseased in enteritis, 177.

Bloodletting, general and local in peritonitis, 167; in relapsing fever, 564.

Blood, effusions of into pleural sac, 280.7.

Botschetschkaroff's experiments on spleen, 45.

BOWELS, ulceration of, 209; definition, remarks, 209; etiology, 210; symptoms, 212; enteric fever in, 214; perforation in, 214; phthisis in, 215; duration of the disease in phthisis, 216; chronic diarrhœa in, 217; dysenteric disease in, 217; duodenum in, 218; jejunum, 218; remittent fever of children, 218; pathology, 219; morbid anatomy, 220; diagnosis, 222; treatment, 222.

Bowels, carcinoma of, 223; remarks, 226; emaciation not always present, 227; tympanitis may be excessive, 228; ring-form in, 228; cancer-cells in, 229; symptoms and diagnosis, 230; simulation of, 231; treatment, 232.

Bowels, fatal obstruction caused by a band of lymph, 233.

Brain, mycoid sarcoma tumour of, 674.

Brain, syphilitic tumour at the base of, 677.

Brec on spleen, 46.

Brunner's glands in peritonitis, 143.

C.

Cæcum, displacement of, 235.

Cæcum, ulceration of, 152.

Calculus concretions in pancreas, 121.

Capsule thick in pancreatic inflammation, 116.

Cancerous growths, a cause of enteritis, 179.

Cancer, spleen of, 97.

Carcinoma cause of peritonitis, 154.

Carcinoma of the bowels, 223.

Carcinoma of the stomach, 351; hereditary tendency, 353; may be blended with non-malignant products, 352; may long subsist, 352; mental harass a cause, 354; relation between cancer and nervous diseases, 354; causes, 370; males more

- prone than females, 370 ; pathology, 370 ; scirrhus-colloid most frequently seen, 371 ; microscopic examination, 371 ; pyloric end its most frequent seat, 372 ; symptoms, 372 ; simple ulcer simulated, 373 ; diagnosis, 374 ; treatment, 375.
- Catarrhal inflammation in enteritis, 188.
- Cellulitis, pelvic, 238.
- China, fever in, 423.
- Children, peritonitis in, 153, 163, 172.
- Chorea, 661 ; predisposing and exciting causes, 662 ; symptoms, 662, 664 ; pathology, 663 ; diagnosis and prognosis, 665 ; summary, 665 ; treatment, 665.
- Chronic diseases of spleen on, 48.
- Chronic glossitis, 734 : causes, 736 ; pathology, 736 ; treatment, 736.
- Chronic splenitis, 63 ; diagnosis in, 64.
- Chronic ulceration of the urinary bladder with hæmorrhage, 651.
- Chronic ulcer of the stomach, 322 ; post-mortem appearance of, 328 ; perforation in, 329 ; females more affected with than males, 330 ; symptoms, 331 ; sickness and vomiting in, 332 ; hæmorrhage in, 334 ; cause, 337 ; pathology, 338 ; diagnosis of, 340 ; treatment of, 342.
- Chronic diarrhoea, cause of ulceration of the bowels, 217.
- Climate and fever, 445.
- Concrete-pus in spleen, 47.
- Cold, application of, in peritonitis, 168.
- Congestion of spleen, 77.
- Colon, perforation of, 147.
- Colon, ulceration of, 220.
- Common ducts obstructed, 658.
- Constipation, a cause of enteralgia, 127.
- Contraction of chest-wall in chronic pleurisy, 283.
- Convulsions, puerperal, 666.
- Corpulence, 617.
- Corvisart on hypertrophy of heart, 5.
- Cormack on contagion of relapsing fever, 452.
- Craigie on pancreas, 115.
- Croup, 725 ; remarks, 725 ; causes, 726 ; pathology, 727 ; symptoms, 729 ; diagnosis, 730 ; prognosis, 731 ; treatment, 731.
- Cystic duct obstructed, 658.
- Cystic hæmatoma, 83.
- Cystitis cause of peritonitis, 156.
- D.
- Decomposition of organic matters, cause of fever, 447.
- Definitions of fever, 436.
- Deflections, alvine in enteritis, 186.
- Degeneration, spleen of, 91.
- Dense population, cause of fever, 448.
- Dentition, cause of enteritis, 199.
- Diagnosis of splenic disease, on, 69 ; softening of spleen, on, 84 ; spleen, extirpation of, on, 106.
- Diaphragm, pus may burrow through, 281.
- Diaphoresis in relapsing fever, 461.
- Diarrhoea in typhoid fever, 399.
- Diet and regimen in peritonitis, 174.
- Diffuse aneurism of abdominal aorta, 613.
- Dilatation, hypertrophy of heart with, 22.
- Diseases not entities as once regarded, 785.
- Dislocation, spleen of, 100.
- Displacement of cæcum, 235.
- Dolor atrox, 164.
- Dorsdoff's experiments on spleen, 45.
- Dothin-enteritis, 195.
- Drainage, bad, cause of typhoid fever, 417.
- Drugs, cause of enteritis, 178.
- Duodenum in peritonitis, 143.
- Dysentery, ulceration in, 148.
- E.
- Effusion in peritonitis, 138.
- Elimination, conservative, 789.
- Embolism, 788.
- Empyema, 279.
- Embolism of pulmonary artery a cause of splenic disease, 47.
- Encephaloid cancer in pancreas, 120.
- ENTERALGIA, 124 ; various names, 124 : causes, 124 ; sex, 124 ; proximate or exciting, 125 ; mental emotion, 125 ; gouty and rheumatic poisons, 125 ; chorea, 125 ; Bright's disease, 125 ; brain and spinal cord when diseased a cause, 126 ; caries of vertebrae, 126 ; indigestion, 126 ; flatus, 126 ; symptoms, 127 ; borborygmi, 128 ; attacks may be intermittent or remittent, 128 ; the outcome of rheumatism or gout lessens the attacks, 128.
- Endemic causes of epidemics, 444.
- Enteric or typhoid fever, 394.
- Enteritis cause of peritonitis, 155.
- ENTERITIS, 175 ; definition, 175 ; synonyms, 176 ; enteritis phlegmonodea, 177 ; in enteric fever, 177 ; etiology, 178 ; tumours a cause, 179 ; occlusion of the bowel, 179 ; cancerous growths, 179 ; symptoms, 180 ; pulse, tongue, respiration, 180 ; distressing symptoms, 181 ; tubular formations of lymph voided, 182 ; fatal termination of, 182 ; gangrene in, 182 ; pathology, 183 ; enteritis erythematosa or muco-enteritis, 184 ; vascularity, 184 ; excess of secretion in, 185 ; valvules conniventes in, 185 ; ulceration and perforation, 186 ; alvine discharges, 186 ; glands and follicles, 188 ; acute muco-enteritis, 188 ; catarrhal inflammation, 188 ; phlegmonous enteritis, 188 ; gastritis may be a cause, 190 ; Brunner's glands, 190 ; phlegmonous inflammation, 193 ; asthenic type, 193 ; Peyer's patches, 195 ; phthisis in, 196 ; mesenteric disease a

cause, 196 ; children in, 197 ; symptoms in children, 199 ; morbid anatomy of, 200 ; sphacelation, 203 ; diagnosis, 203 ; prognosis, 205 ; treatment, 206.

Epidemics, variations of, 439.

Erysipelatous peritonitis, 140.

Erythema circinatum, 693.

Etiology, general, of spleen, 111.

Exanthematous and continued fevers, resemblances, 402.

Excess of secretion in enteritis, 185.

Experiments on spleen by Griesinger, 50.

Exfoliation of the bladder, 654.

F.

Fæcal collections a cause in enteritis, 192.

Fæcal matter in urine, 226.

Fæces, accumulations of, may resemble splenic disease, 44.

Fatal termination in enteritis, 182.

Fatty growths obstructing the cystic and common ducts, 658.

Fatty matters discharged from the bowels in pancreatic disease, 113.

Favourable signs in enteritis, 182.

Fayrer on microscopic changes in spleen, 47.

Fever not inflammation, 469.

Fever, poverty a cause of, 440, 441.

Fever, relapsing, 420.

Fevers, specific, 796.

Fever, typhoid or enteric, 394.

Fistula gastric, 162.

Fittermann, spleen, rupture of, on, 88.

Flatus a cause of enteralgia, 126.

Fothergill on hypertrophy of heart, 4.

Frerichs, spleen, on, 51.

Fungous elevations in lining coat of intestines, 201.

G.

Gall-bladder, laceration of, 149.

Gall-ducts, obstruction of, 165.

Gangrene in peritonitis, 138.

Gangrene, spleen of, 89.

Gangrene in typhoid fever, 418.

Garrod on acute rheumatism, 406.

Gases in cavity of peritoneum, 158.

Gases in pleural sac, 280.

Gastric fistula, 162.

Gastric peritonitis, 154.

Gastritis a cause of enteritis, 190.

Gastorrhœa, 331.

Grotanelli, spleen on, 73.

Growth, anomalous, spleen, on, 99.

Glottis, spasm of, 716.

Glossitis, chronic, 734 ; causes and pathology, 736 ; diagnosis, 738.

Gray, spleen on, 34.

Great plague, 424.

Griesinger on spleen, 50.

Gout a cause of enteritis, 197.

H.

Hæmatemesis, 341.

Hæmatocele connected with the left kidney, 645 ; symptoms and diagnosis, 645.

Hæmorrhage in pancreatic disease, 117.

Hæmorrhage in chronic ulceration of urinary bladder, 651 ; morbid appearances, 652.

Heart disease often cause of apoplexy, 242, 245.

HEART, hypertrophy of, 1 ; definition of, 1 ; varieties of hypertrophy, 1 ; etiology and pathology, 2 ; remote and predisposing causes, 2 ; sex, 2 ; Quain on, 3 ; great muscular exertion, 3 ; endarteritis deformans, 4 ; proximate or exciting causes, 5 ; conditions of obstruction, 7 ; aortic stenosis, 7 ; in aortic regurgitation, 8 ; in aortic aneurism, 8 ; in tumours, 9 ; in mitral stenosis, 9 ; in mitral regurgitation, 9 ; hypertrophy in the right ventricle, 9 ; embolism in, 10 ; in Bright's disease, 11 ; sphygmograph, 12 ; pathological anatomy, 13 ; muscular change, 13 ; excentric and concentric thickening, 14 ; complications and sequences, 15 ; in sanguineous apoplexy, 16 ; peri- and endocarditis in, 16 ; emphysema result in, 17 ; cerebral affections come on in, 17 ; mental excitation ; symptoms, 18 ; inspection, 18 ; palpation, 19 ; dyspnœa, 19 ; cough, 20 ; hæmoptysis and other hæmorrhages, 20 ; palpitation, 20 ; pulse, 20 ; left ventricle, 21 ; blood-shot eyes and pains in head, indications, 21 ; simple hypertrophy of, 22 ; in hypertrophy with dilatation of left ventricle, 22 ; percussion, 22 ; auscultation, 23 ; right ventricle, 23 ; inspection of, 23 ; palpation, 23 ; percussion, 23 ; *coup de marteau*, 23 ; auscultatory signs, 24 ; auricles, 24 ; diagnosis, 24 ; in left hypertrophy, 24 ; in right hypertrophy, 25 ; dilatation, 25 ; prognosis, 25 ; treatment, 25 ; mental and bodily exertion to be avoided, 26.

Hemiplegia, syphilitic, 680.

Hepatitis cause of peritonitis, 154.

Hodgkin, spleen, on, 94.

Hydatid, spleen of, 90.

Hydronephrosis, 640 ; causes, 641 ; contained fluid, 643 ; double congenital, 643 ; symptoms and diagnosis, 644.

Hygienics, 799.

I.

Icterus in enteritis, 191.

Icterus in pancreatic obstruction, 118.

Ileum, ulceration of, 220.

Ileum ulcerated in typhoid fever, 398.

Ilio-cæcal valve in peritonitis, 144.

Indigestion a cause of enteralgia, 126.
 Induration of pancreas, 117.
 Induration of spleen, 86.
 Infantieide, 743; post-mortem appearances, 743; concealment of birth, 746; evidences of maturity, 747; evidences of having been born alive, 748; lung test, 751.
 Infants may have peritonitis, 153.
 Infarction, embolie, spleen of, 72.
 Inflammation of peritoneum, 138.
 Insufficiency of food and clothing causes of fever, 448.
 Intussusception cause of enteritis, 179.
 Irregularity of pulse in typhoid fever, 400.
 Ireland, fevers, in, 425, 426, 427, 428.
 Irish, affected with relapsing fever, 458.
 Irritation of gall-stones in liver, 378.

J.

Jaschkowitz, spleen, on, 35.
 Jaundice, relapsing fever in, 514.
 Jejunum, immunity of, in peritonitis, 144.
 Jellies to be given in enteritis, 208.
 Jenner, spleen, on, 35; symptoms of splenic disease, on, 43; diagnosis of splenic disease, on, 69; softening of spleen, on, 85; spleen, extirpation of, on, 106; symptomatology, spleen of, on, 112.
 Jürgensen, spleen on, 56.

K.

Kelsch, leucocythæmia on, 712.
 Kidney, pus in, disease of spleen, 72.
 Kölliker, spleen, on, 34.
 Kückler, spleen, extirpation of by, 105.
 Küttner, spleen rupture, of, on, 88.

L.

Latham on causes of enteritis, 183.
 Lead palsy, 770; deltoid muscles wasted, 771; pathology, 772; treatment, 772.
 Left ventricle, aneurism of, 606.
 Legroux on cause of death in pleuritic effusion, 320.
 Leucocythæmia, 711; etiology and pathology, 712; symptoms and diagnosis, 714; treatment, 715.
 Leucocythæmia, spleen large in, 43.
 Leukæmia, 711.
 Lieberkühnian follicles, 188.
 Liebig's extract to be given in enteritis, 208.
 Ligature in aneurism, 604.
 LIVER, carcinoma of, 377; more liable to cancer than any other organ, 377; colloid and alveolar mostly seen, 377; hereditary, 378; these deposits may be found throughout the organ, 380; morbid and microscopic appearances, 380, 381; difficulties in its recognition, 382; states resembling the affection, 382; jaundice not always a consequence, 382; may come on in those who before

seemed most healthy and strong, 382; may press upon other viscera, 383; co-existence of tubercle and cancer in, 385; scirrhus-alveolar variety, 386; pathology, 387; very frequent in liver, 388; nodulated form, 389; transfer of germs, 390; removal of hepatic structure, 391; morbid results, effect on ducts, jaundice, 392; ascites, 393.
 Local cause of typhoid fever, 401.
 Locomotor ataxy, 794.
 London, fever in, 431.
 Lung, abolished by compression, 310.
 Lupus erythematosus treated by lemon juice, 695.
 Lymphic plug in perforation of peritoneum, 146.
 Lymph, band of, in obstruction of the bowels, 233.

M.

Males more subject to aneurism than females, 600.
 Matter, subcutaneous collections of may resemble splenic disease, 45.
 Matting together of internal organs in peritonitis, 159.
 Melanosis in pancreas, 121.
 Melanotic evacuations in chronic ulcer of the stomach, 336.
 Membranes, plastic in peritonitis, 160.
 Meningitis, tubercular, 667.
 Mitral stenosis, 9.
 Mitral regurgitation, 9.
Motus abnormis, 187.
 Mucro-enteritis, 184.
 Murchison, spleen, diseases of, on, 85.
 Murehison, perforation of the bowels, 145.
 Muscular coat in enteritis, 202.
 Myeloid sarcoma tumour of the brain, 674.

N.

Narrowing of blood-vessels in hypertrophy of the heart, 3.
 Nausea and vomiting in perforation of peritoneum, 146.
 New disease, relapsing fever, 460.
 Niemeyer on hypertrophy of the heart, 3.
 Nodulated form of cancer in liver, 389.
 Non-plastic or erysipelatous peritonitis, 140.
 Normandy, *suetie* fever, 460.
 Number of relapsing fever cases, 455.

O.

O'Beirne's elastic tube, 169.
 Obesity, 616; common in the young, 620; Chossat's experiments in the inhabitants of the arctic regions, 621; in infants, 621; females most disposed to be fat, 622; hereditary predisposition, 622; liver liable to be obstructed by it, 623; vesicles, 624; lower animals, experiments on, 625; treatment, 636.

Occlusion of the bowels a cause of enteritis, 179.

O Connor, spleen, on, 98.

Operation of paracentesis thoracis, 291.

Opium in peritonitis, 168.

Oppolzer, carcinoma of the liver, on, 377.

Organic matters, decomposition of, a cause of fever, 447.

Organisms, minute, in the blood, 798.

Orifice, pyloric, may become closed in cancer, 373.

Ossific conversions in peritonitis, 155.

Ovaritis in peritonitis, 156.

Ovariectomy and peritonitis, 157.

P.

Palsy, lead, 770.

PANCREAS, 108; ancient ignorance of its functions, 108; in middle ages referred to, 108; older authors, 109; office, 109; emulsifies fatty matters, 110; general etiology, 111; rare in infants and the young, diseases of, 112; symptomatology, 112; presses on adjacent organs, 113; discharge of fatty matter from the bowels, 113; inflammation, 114; depositions of pus in, 115; capsule becomes thick, 116; abscess, 116; ulceration, 116; gangrene, 116; weight in its disease, 117; hypertrophy and other changes, 117; atrophy, 117; induration, 117; softening, 118; fatty degeneration, scirrhus, 118; cancer, 119; encephaloid form, 120; fungus hæmatodes, 121; melanosis, 120; tubercle, 121; steatoma, 121; calculous concretions, 121; cysts, 121; general diagnosis, 121; difficulties in, 121; treatment, 122; palliatives when there is malignancy, 123; should always rest in horizontal posture, 123.

Pancreas, cancer in, 162.

Pelvic cellulitis, 238.

Perforation of peritoneum, 141.

Perforation in chronic ulcer of the stomach, 329, 340.

Perforation in cancer of the stomach, 369.

Pericæcal abscess, 151.

Perityphlitis, 151.

PERITONITIS, definition, 133; preliminary observations, 133; etiology, 135; symptomatology, 136; effusion, 138; varieties, 139; non-plastic or erysipelatous, 140; perforation, 141; symptoms, 142; duodenum, 143; jejunum, 143; ileum perforated, 144; vermiform appendix ulcerated, 145; nausea and vomiting, 146; masked by delirium, 146; time after perforation, 146; symptoms of perforation, 147; average of, 148; dysentery in, 148; puerperal peritonitis, 149; suddenly come on, 150; abdomen becomes large, 150; may be no pain, 150; pulse, 151; perityphlitis, 151;

cæcum, 152; children, in, 153; exit of matter in, 152; pus variously evacuated, 154; complications, 154; gastritis with, 154; tumours, 154; carcinoma, 154; hepatitis in, 154; acute splenitis in, 155; enteritis in, 155; intussusception, 156; nephritis in, 156; perinephritis, 156; hystitis, 156; ovaritis, 156; empyema a cause, 157; morbid anatomy, 157; serous secretion, 158; pus in cavity, 159; hepatitis in, 161; puerperal, 162; diagnosis, 163; neuralgia simulates it, 164; prognosis, 166; treatment of, 166; bloodletting in, 167; cupping in, 167; cold applications, 168; opium in, 168; vesication, 169; diaphoretics and diuretics in, 170; asthenic type, 170; Bright's disease in, 171.

Peyer's patches, 195.

Phlegmonous enteritis, 188.

Phthisis, enteritis in, 196.

Plague, great, 424.

PLEURITIC, SEROUS, AND PURULENT EFFUSIONS, 249; introductory remarks, 249; adhesion, 250; commentary, 262; inspection, 265; empyema, 266; palpation, 268; percussion, 268; dullness, 270; auscultation, 270; pathology, 275; pyogenic conditions in, 278; treatment, 284; summary, 318; conclusion, 318.

Poisoning suspected, 755.

Poisoning by laudanum, 761; symptoms and diagnosis, 763; resembled by intoxication, 763; comatose condition soon comes on, 765; morbid states on inspection, 766; treatment, 767.

Poisoning by sulphuric acid, 774; morbid appearances, 775.

Poisoning by Burnett's disinfecting fluid, 777; symptoms, 779; treatment, 779.

Puerperal peritonitis, 149.

Puerperal convulsions, 666; remarks, 699; causes and pathology, 700; treatment, 703; comment, 705; bloodletting in, 705.

Q.

Quain, hypertrophy of heart, on, 5; causes of, 5; phthisis pulmonalis, a cause of, 10; colour of parietes in, 15.

Quantity, large of pus in pleural sac, 279.

Quick removal of fluid in pleuritic effusion, danger of, 319.

Quittenbaum, spleen, extirpation of, 105.

R.

Rami splenici, 32.

Relapsing fever, 420; introductory observations, 420; ancient writers on, 421; during middle ages, 422; general doctrines and essential phenomena of fever, 436; general observations on epidemics, 442; endemic causes, 444;

- climate, 445 ; mental depression, 449 ; contagion, 450 ; history, 453 ; number in hospitals, 456 ; a new disease, 459 ; cold a cause, 462 ; sex, 463 ; averages, 463 ; pathology, 464 ; prominent features of the disease, 473 ; petechial spots, 486 ; spleen affected in, 507 ; sequelæ, 553 ; treatment, 561 ; conclusive remarks, 579.
- Renal abscess resembles disease of spleen, 44.
- Renal calculus, 165.
- Rheumatism simulated in typhoid fever, 405.
- Right ventricle, hypertrophy of, 23.
- Rindfleisch, on spleen, 50.
- Ring-formation of cancer in bowels, 228.
- Rocky, cancerous lumps in liver, 389.
- Rupture in ventricular aneurism, 611.
- S.
- Sarcina ventriculi, 334.
- Scotland, fevers in, 429.
- Scorbutus, 685 ; treatment, 686 ; remarks, 686.
- Seasons and weather causes of epidemics, 446.
- Secretion, excess of, in enteritis, 185.
- Small fatty growths obstructing the cystic and common ducts, 658.
- Spasmus glottidis, 716 ; remarks and causes, 717 ; pathology, 719 ; in infants, 721 ; treatment, 723.
- Spleen, enlargement of, in leucocythæmia, 711.
- SPLEEN, diseases of, 27 ; general terminology, 27 ; ancient or remote opinions of its use and morbid conditions, 28 ; modern and more recent notions of its office, 29 ; peculiar structure, 31 ; Embleton on, 31 ; nerves, of 33 ; temporarily enlarged during digestion, 33 ; forms blood-corpuscles, 34 ; contains iron, 34 ; is a diverticulum, 34 ; a balance to the circulation, 34 ; general etiology, 35 ; Hodgkin on, 35 ; beneficial influence of drainage, 36 ; causes of its disease, the opinions of the ancient, mediæval, and modern physicians, 36 ; countries in which it prevails, 36 ; malarial influences, 37 ; sudden transitions of temperature, influence of, 37 ; the complication of intermittent, typhus, enteric, and relapsing fevers, 38 ; occurs in cirrhosis, endocarditis, 39 ; capillary embolism a cause, 39 ; diseases of liver, a cause, 39 ; general symptomatology, 40 ; shoulder-pain, 40 ; facial state, 41 ; acute and sub-acute symptoms, 41 ; Fayer, Sir Joseph, on, 41 ; simulated by disease of other organs, 42 ; physical signs, 42 ; hæmorrhagic tendency in chronic forms, 42 ; gait altered, inclination to the left side, 43 ; in leucocythæmia, 43 ; renal abscess may resemble it, 44 ; left kidney enlargement may simulate it, 44 ; general pathology, 45 ; subcutaneous collections of matter, 45 ; obstruction of portal vein may produce congestion of, 46 ; its structure microscopically examined, 46 ; morbid appearances discovered in various fevers, 47 ; molecular changes in, 47 ; softening and enlargement in fevers, 47 ; its chronic forms of disease, 48 ; enlargement most notable condition, 49 ; anæmia quickly comes on, 49 ; melanæmia, 50 ; morbus cordis from, 52 ; abscesses, 53 ; resemblance of blood to that of scorbutus, 54 ; in specific fevers, 55 ; enteric and exanthems in, 56 ; low vegetable organisms a cause in, 57 ; bacteria, 58 ; hæmorrhages, 59 ; acute splenitis, 60 ; causes, 60 ; symptoms, 60 ; diagnosis, 61 ; treatment, 62 ; chronic splenitis, 63 ; causes, 63 ; symptoms, 63 ; diagnosis, 64 ; treatment, 66 ; diseases of it in children, 67 ; symptoms, 68 ; diagnosis, 69 ; treatment, 70 ; abscess of spleen, 71 ; symptomatology and diagnosis, 73 ; prognosis, 74 ; treatment, 75 ; congestion and hypertrophy, 77 ; symptoms and diagnosis, 78 ; treatment, 79 ; splenalgia, 81 ; symptoms and diagnosis, 81 ; tumours, 82 ; general morbid anatomy, 83 ; softening, 84 ; induration, 86 ; atrophy, 86 ; hæmorrhage into and rupture, 87 ; gangrene, 89 ; hydratids, 90 ; degeneration, 91 ; syphilitic in, 95 ; tubercle, 97 ; cancer, 97 ; other anomalous growths, 99 ; dislocation and malformation, 100 ; supernumerary spleens, 101 ; general diagnosis, 101 ; general prognosis, 104 ; conclusion, 105 ; extirpation of, 105.
- Stewart, typhoid fever, on, 394.
- Stomach, ulceration of in peritonitis, 142.
- Stomach, carcinoma of, 351.
- Subclavian aneurism, 594.
- Supernumerary spleens, 101 ; chronic ulcer of, 302.
- Suspected poisoning, 755 ; autopsy, 755 ; stomach tests, 755.
- Sweating sickness, 423.
- Sydenham, on fever, 424.
- Syphilitic tumour at the base of the brain, 677.
- Syphilitic hemiplegia, 680 ; treatment, 682 ; remarks, 683.
- T.
- Tabes mesenterica caused by enteritis, 198.
- Tenias, 740 ; causes and symptoms, 741 ; treatment, 742.
- Tenesmus, enteritis in, 193.
- Therapeutics, 799.

Thoracentesis, 287.
 Thorn in the flesh, 781.
 Thrombosis, 788.
 Tonnellie on pancreatic abscess, 116.
 Trousseau on spleen, 50.
 Tubercle in pancreas, 121.
 Tubercular meningitis, 667; symptoms, 667; invasion, 668; morbid anatomy, 672; prognosis and treatment, 673.
 Tubercle, spleen of, 97.
 Tumours, spleen of, 82.
 Tumour, myeloid sarcoma of the brain, 674.
 Tumour, syphilitic, at the base of the brain, 67.
 Twining, spleen, on, 38.
 Tympanitis, carcinoma of the bowels in, 228.
 Typhoid fever, 394; initiatory symptoms, 395; general symptoms, 395; duration, 396; cerebral functions less affected than in typhus, 397; resemblance to exanthems, 398; differs from the relapsing, 399; diarrhoea very commonly comes on, 399; greatest mortality on the twenty-second day, 400; treatment, 412; stimulants in, 414.

U.

Ulceration of inner coat of intestines in enteritis, 203.
 Ulceration of the bowels, 209.
 Ulceration of ileum in typhoid fever, 398.
 Ulcer of the stomach, chronic, 322.
 Uremia, 646; symptoms, 646; diagnosis, 648; toxæmia, 649.
 Urinary-bladder, ulcerations into, 226.

V.

Vallin on fatal pleuritic effusion, 320.
 Vals and Vichy waters, remedies in splenic disease, 76.
 Valvules conniventes in enteritis, 185.
 Van der Byl, carcinoma of the liver, on, 377.

Vascularity in enteritis, 184.
 Venesection in puerperal convulsions, 705.
 Ventricle, left, aneurism of, 606; etiology and pathology, 609.
 Vermiform appendix seat of perforation in peritonitis, 144.
 Vertebrae, caries of, a cause of enteralgia, 126.
 Vesication in peritonitis, 169, 171.
 Villous coat of intestines in enteritis, 201.
 Virchow, spleen, on, 53; syphilitic affections of, on, 96.
 Voight, spleen, on, 81.
 Volume of blood when augmented in hypertrophy of heart, 3.
 Vomit, black, relapsing fever, in, 524.
 Vomiting in chronic ulcer of the stomach, 341.
 Vomiting in disease of the pancreas, 113.

W.

Walcheren, fever-diseases of spleen, on, 85.
 Walshe, hypertrophy of heart, on, 15.
 Washing-out of thoracic cavity, 303.
 Weather and seasons causes of epidemics, 446.
 Weight of pancreas when diseased, 117.
 Welsh on fever, 438.
 Wells, spleen, extirpation of, by, 105.
 West, enteritis of children, on, 199.
 Wilks, spleen, on, 53.

Y.

Yellow cases of relapsing fever, 446, 447.
 Yellow discharge from infant's nostrils in disease of spleen, 99.
 Yellow opaque nodules on spleen, 69.

Z.

Zaccarelli, extirpation of spleen, on, 105.
 Ziemssen on chronic ulcer of the stomach, 332.





February, 1885.

CATALOGUE OF WORKS

PUBLISHED BY

H. K. LEWIS

136 GOWER STREET, LONDON, W.C.

G. GRANVILLE BANTOCK, M.D., F.R.C.S. EDIN.
Surgeon to the Samaritan Free Hospital for Women and Children.

I.

ON THE USE AND ABUSE OF PESSARIES. Second Edition,
with Illustrations, 8vo, 5s.

II.

A PLEA FOR EARLY OVARIOTOMY. Demy 8vo, 2s.

FANCOURT BARNES, M.D., M.R.C.P.

Physician to the Chelsea Hospital for Women; Obstetric Physician to the Great Northern Hospital, &c.

A GERMAN-ENGLISH DICTIONARY OF WORDS AND
TERMS USED IN MEDICINE AND ITS COGNATE SCIENCES.
Square 12mo, Roxburgh binding, 9s.

ASHLEY W. BARRETT, M.B. LOND., M.R.C.S., L.D.S.

Dental Surgeon to the London Hospital, &c.

DENTAL SURGERY FOR GENERAL PRACTITIONERS
AND STUDENTS OF MEDICINE. With Illustrations, crown 8vo,
3s. [Now ready.
Lewis's Practical Series].

ROBERTS BARTHOLOW, M.A., M.D., LL.D.

Professor of Materia Medica and Therapeutics, in the Jefferson Medical College of Philadelphia, &c., &c.

I.

A TREATISE ON THE PRACTICE OF MEDICINE, FOR
THE USE OF STUDENTS AND PRACTITIONERS. Fifth
Edition, with Illustrations, large 8vo, 21s. [Just published.

II.

A PRACTICAL TREATISE ON MATERIA MEDICA AND
THERAPEUTICS. Fifth Edition, Revised and Enlarged, 8vo, 18s.
[Just published.

GEO. M. BEARD, A.M., M.D.

Fellow of the New York Academy of Medicine; Member of the American Academy of Medicine, &c.

AND

A. D. ROCKWELL, A.M., M.D.

Fellow of the New York Academy of Medicine; Member of the American Academy of Medicine, &c.

A PRACTICAL TREATISE ON THE MEDICAL AND
SURGICAL USES OF ELECTRICITY. Including Localized and
General Faradization; Localized and Central Galvanization; Frank-
linization; Electrolysis and Galvano-Cautery. Fourth Edition. With
nearly 200 Illustrations, roy. 8vo, 28s. [Just published.

A. HUGHES BENNETT, M.D.

Member of the Royal College of Physicians of London; Physician to the Hospital for Epilepsy and Paralysis, Regent's Park, and Assistant Physician to the Westminster Hospital.

I.
A PRACTICAL TREATISE ON ELECTRO-DIAGNOSIS
IN DISEASES OF THE NERVOUS-SYSTEM. With Illustrations,
8vo, 8s. 6d.

II.
ILLUSTRATIONS OF THE SUPERFICIAL NERVES AND
MUSCLES, WITH THEIR MOTOR POINTS, A knowledge of
which is essential in the Art of Electro-Diagnosis. (Extracted from the
above). 8vo, paper cover, 1s. 6d.; cloth, 2s.

III.
ON EPILEPSY: ITS NATURE AND TREATMENT. 8vo, 2s. 6d.

DR. THEODOR BILLROTH.

Professor of Surgery in Vienna.

GENERAL SURGICAL PATHOLOGY AND THERA-
PEUTICS. In Fifty-one Lectures. A Text-book for Students and
Physicians. With additions by Dr. ALEXANDER VON WINIWARTER, Pro-
fessor of Surgery in Luttich. Translated from the Fourth German edi-
tion with the special permission of the Author, and revised from the
Tenth edition, by C. E. HACKLEY, A.M., M.D. Copiously illustrated,
8vo, 18s.

G. H. BRANDT, M.D.

I.
ROYAT (LES BAINS) IN AUVERGNE, ITS MINERAL
WATERS AND CLIMATE. With Frontispiece and Map. Second
edition, crown 8vo, 2s. 6d.

II.
HAMMAM R'IRHA, ALGIERS. A Winter Health Re-
sort and Mineral Water Cure Combined. With Frontispiece and Map,
crown 8vo, 2s. 6d.

GURDON BUCK, M.D.

CONTRIBUTIONS TO REPARATIVE SURGERY; SHOW-
ing its Application to the Treatment of Deformities, produced by De-
structive Disease or Injury; Congenital Defects from Arrest or Excess
of Development; and Cicatricial Contractions from Burns. Illustrated
by numerous Engravings, large 8vo, 9s.

ALFRED H. CARTER, M.D. LOND.

*Member of the Royal College of Physicians; Physician to the Queen's Hospital, Birmingham;
Examiner in Medicine for the University of Aberdeen, &c.*

ELEMENTS OF PRACTICAL MEDICINE. Third Edition,
crown 8vo, 9s. [Now ready.]

P. CAZEAUX.

Adjunct Professor in the Faculty of Medicine of Paris, &c.

AND

S. TARNIER.

*Professor of Obstetrics and Diseases of Women and Children in the Faculty of Medicine of
Paris.*

OBSTETRICS: THE THEORY AND PRACTICE; including
the Diseases of Pregnancy and Parturition, Obstetrical Operations, &c.
Seventh Edition, edited and revised by ROBERT J. HESS, M.D., with
twelve full-page plates, five being coloured, and 165 wood-engravings,
1081 pages, roy. 8vo, 35s. [Now ready.]

JOHN COCKLE, M.A., M.D.
Physician to the Royal Free Hospital.

ON INTRA-THORACIC CANCER. 8vo, 4s. 6d.

W. H. CORFIELD, M.A., M.D. OXON.
Professor of Hygiene and Public Health in University College, London.

DWELLING HOUSES: Their Sanitary Construction and Arrangements. Second Edit., with Illustrations. Cr. 8vo, 3s. 6d. [*Just ready.*]

J. THOMPSON DICKSON, M.A., M.B. CANTAB.
Late Lecturer on Mental Diseases at Guy's Hospital.

THE SCIENCE AND PRACTICE OF MEDICINE IN
RELATION TO MIND, the Pathology of the Nerve Centres, and the
Jurisprudence of Insanity, being a course of Lectures delivered at Guy's
Hospital. Illustrated by Chromo-lithographic Drawings and Physiologi-
cal Portraits. 8vo, 14s.

HORACE DOBELL, M.D.
Consulting Physician to the Royal Hospital for Diseases of the Chest, &c.

I.
ON DIET AND REGIMEN IN SICKNESS AND HEALTH,
and on the Interdependence and Prevention of Diseases and the Diminu-
tion of their Fatality. Seventh Edition, 8vo, 10s. 6d.

II.
AFFECTIONS OF THE HEART AND IN ITS NEIGH-
BOURHOOD. Cases, Aphorisms, and Commentaries. Illustrated by
the heliotype process. 8vo, 6s. 6d.

JOHN EAGLE.
Member of the Pharmaceutical Society.

A NOTE-BOOK OF SOLUBILITIES. Arranged chiefly for the
use of Prescribers and Dispensers. 12mo, 2s. 6d.

JOHN ERIC ERICHSEN.
*Holme Professor of Clinical Surgery in University College; Senior Surgeon to University
College Hospital, &c.*

MODERN SURGERY; Its Progress and Tendencies. Being the
Introductory Address delivered at University College at the opening
of the Session 1873-74. Demy 8vo, 1s.

DR. FERBER.

MODEL DIAGRAM OF THE ORGANS IN THE THORAX
AND UPPER PART OF THE ABDOMEN. With Letter-press
Description. In 4to, coloured, 5s.

AUSTIN FLINT, JR., M.D.

Professor of Physiology and Physiological Anatomy in the Bellevue Medical College, New York; attending Physician to the Bellevue Hospital, &c.

I.

A TEXT-BOOK OF HUMAN PHYSIOLOGY; DESIGNED
for the Use of Practitioners and Students of Medicine. New edition,
Illustrated by plates, and 313 wood engravings, large 8vo, 28s.

II.

**THE PHYSIOLOGY OF THE SPECIAL SENSES AND
GENERATION; (Being Vol. V. of the Physiology of Man).** Roy. 8vo,
18s.

J. MILNER FOTHERGILL, M.D.

Member of the Royal College of Physicians of London; Physician to the City of London Hospital for Diseases of the Chest, Victoria Park, &c.

I.

**THE HEART AND ITS DISEASES, WITH THEIR TREAT-
MENT; INCLUDING THE GOUTY HEART.** Second Edition,
entirely re-written, copiously illustrated with woodcuts and litho-
graphic plates. 8vo. 16s.

II.

**INDIGESTION, BILIOUSNESS, AND GOUT IN ITS PRO-
TEAN ASPECTS.**

PART I.—INDIGESTION AND BILIOUSNESS. Post 8vo, 7s. 6d.

PART II.—GOUT IN ITS PROTEAN ASPECTS. Post 8vo, 7s. 6d.

III.

HEART STARVATION. (Reprinted from the Edinburgh Medical
Journal), 8vo, 1s.

ERNEST FRANCIS, F.C.S.

Demonstrator of Practical Chemistry, Charing Cross Hospital.

PRACTICAL EXAMPLES IN QUANTITATIVE ANALYSIS,
forming a Concise Guide to the Analysis of Water, &c. Illustrated,
fcap. 8vo, 2s. 6d.

HENEAGE GIBBES, M.D.

*Lecturer on Physiology and Histology in the Medical School of Westminster Hospital; late
Curator of the Anatomical Museum at King's College.*

PRACTICAL HISTOLOGY AND PATHOLOGY. Second Edit.
revised and enlarged. Crown 8vo, 5s.

C. A. GORDON, M.D., C.B.

Deputy Inspector General of Hospitals, Army Medical Department.

REMARKS ON ARMY SURGEONS AND THEIR WORKS.
Demy 8vo, 5s.

W. R. GOWERS, M.D., F.R.C.P. M.R.C.S.

Physician to University College Hospital, &c.

DIAGRAMS FOR THE RECORD OF PHYSICAL SIGNS.

In books of 12 sets of figures, 1s. Ditto, unbound, 1s.

SAMUEL D. GROSS, M.D., LL.D., D.C.L., OXON.

Professor of Surgery in the Jefferson Medical College of Philadelphia.

A PRACTICAL TREATISE ON THE DISEASES, INJURIES, AND MALFORMATIONS OF THE URINARY BLADDER, THE PROSTATE GLAND; AND THE URETHRA. Third Edition, revised and edited by S. W. GROSS, A.M., M.D., Surgeon to the Philadelphia Hospital. Illustrated by 170 engravings, 8vo, 18s.

SAMUEL W. GROSS, A.M., M.D.

Surgeon to, and Lecturer on Clinical Surgery in, the Jefferson Medical College Hospital, and the Philadelphia Hospital, &c.

A PRACTICAL TREATISE ON TUMOURS OF THE MAMMARY GLAND: embracing their Histology, Pathology, Diagnosis, and Treatment. With Illustrations, 8vo, 10s. 6d.

WILLIAM A. HAMMOND, M.D.

Professor of Mental and Nervous Diseases in the Medical Department of the University of the City of New York, &c.

I.
A TREATISE ON THE DISEASES OF THE NERVOUS SYSTEM. Seventh edition, with 112 Illustrations, large 8vo, 25s.

II.
A TREATISE ON INSANITY. Large 8vo, 25s. [Just published.]

III.
SPIRITUALISM AND ALLIED CAUSES AND CONDITIONS OF NERVOUS DERANGEMENT. With Illustrations, post 8vo, 8s. 6d.

ALEXANDER HARVEY, M.A., M.D.

Emeritus Professor of Materia Medica in the University of Aberdeen; Consulting Physician to the Aberdeen Royal Infirmary, &c.

FIRST LINES OF THERAPEUTICS; as based on the Modes and the Processes of Healing, as occurring Spontaneously in Disease; and on the Modes and the Processes of Dying, as resulting Naturally from Disease. In a series of Lectures. Post 8vo, 5s.

ALEXANDER HARVEY, M.D.

Emeritus Professor of Materia Medica in the University of Aberdeen, &c.

AND

ALEXANDER DYCE DAVIDSON, M.D.

Professor of Materia Medica in the University of Aberdeen.

SYLLABUS OF MATERIA MEDICA FOR THE USE OF TEACHERS AND STUDENTS. Based on a selection or definition of subjects in teaching and examining; and also on an estimate of the relative values of articles and preparations in the British Pharmacopœia with doses affixed. Seventh Edition, 32mo.

[In preparation]

GRAILY HEWITT, M.D.

Professor of Midwifery and Diseases of Women in University College, Obstetrical Physician to University College Hospital, &c.

OUTLINES OF PICTORIAL DIAGNOSIS OF DISEASES OF WOMEN. Fol. 6s.

BERKELEY HILL, M.B. LOND., F.R.C.S.

Professor of Clinical Surgery in University College; Surgeon to University College Hospital and to the Lock Hospital.

THE ESSENTIALS OF BANDAGING. For Managing Fractures and Dislocations; for administering Ether and Chloroform; and for using other Surgical Apparatus. Fifth Edition, revised and much enlarged, with Illustrations, fcap. 8vo, 5s.

BERKELEY HILL, M.B. LOND., F.R.C.S.

Professor of Clinical Surgery in University College; Surgeon to University College Hospital and to the Lock Hospital.

AND

ARTHUR COOPER, L.R.C.P., M.R.C.S.

Late House Surgeon to the Lock Hospital, &c

I.

SYPHILIS AND LOCAL CONTAGIOUS DISORDERS.

Second Edition, entirely re-written, royal 8vo, 18s.

II.

THE STUDENT'S MANUAL OF VENEREAL DISEASES. Being a Concise Description of those Affections and of their Treatment. Third Edition, post 8vo, 2s. 6d.

HINTS TO CANDIDATES FOR COMMISSIONS IN THE PUBLIC MEDICAL SERVICES, WITH EXAMINATION QUESTIONS, VOCABULARY OF HINDUSTANI MEDICAL TERMS, ETC. 8vo, 2s.

SIR W. JENNER, Bart., M.D.

Physician in Ordinary to H.M. the Queen, and to H.R.H. the Prince of Wales.

THE PRACTICAL MEDICINE OF TO-DAY: Two

Addresses delivered before the British Medical Association, and the Epidemiological Society, (1869). Small 8vo, 1s. 6d.

C. M. JESSOP, M.R.C.P.

Associate of King's College, London; Brigade Surgeon H.M. British Forces.

ASIATIC CHOLERA, being a Report on an Outbreak of Epidemic Cholera in 1876 at a Camp near Murree in India. With map, demy 8vo, 2s. 6d.

GEORGE LINDSAY JOHNSON, M.A., M.B., B.C. CANTAB.
Clinical Assistant, late House Surgeon and Chloroformist, Royal Westminster Ophthalmic Hospital; Medical and Surgical Registrar, &c.

A NEW METHOD OF TREATING CHRONIC GLAUCOMA, based on Recent Researches into its Pathology. With Illustrations and coloured frontispiece, demy 8vo, 3s. 6d.

NORMAN W. KINGSLEY, M.D.S., D.D.S.
President of the Board of Censors of the State of New York; Member of the American Academy of Dental Science, &c.

A TREATISE ON ORAL DEFORMITIES AS A BRANCH OF MECHANICAL SURGERY. With over 350 Illustrations, 8vo, 16s.

E. A. KIRBY, M.D., M.R.C.S. ENG.
Late Physician to the City Dispensary.

I.
A PHARMACOPŒIA OF SELECTED REMEDIES, WITH THERAPEUTIC ANNOTATIONS, Notes on Alimentation in Disease, Air, Massage, Electricity and other Supplementary Remedial Agents, and a Clinical Index; arranged as a Handbook for Prescribers. Sixth Edition, enlarged and revised, demy 4to, 7s.

II.
ON THE VALUE OF PHOSPHORUS AS A REMEDY FOR LOSS OF NERVE POWER. Fifth Edition, 8vo, 2s. 6d.

J. WICKHAM LEGG, F.R.C.P.
Assistant Physician to Saint Bartholomew's Hospital, and Lecturer on Pathological Anatomy in the Medical School.

I.
ON THE BILE, JAUNDICE, AND BILIOUS DISEASES. With Illustrations in chromo-lithography, 719 pages, roy. 8vo, 25s.

II.
A GUIDE TO THE EXAMINATION OF THE URINE; intended chiefly for Clinical Clerks and Students. Fifth Edition, revised and enlarged, with additional Illustrations, fcap. 8vo, 2s. 6d.

III.
A TREATISE ON HÆMOPHILIA, SOMETIMES CALLED THE HEREDITARY HÆMORRHAGIC DIATHESIS. Fcap. 4to, 7s. 6d.

DR. GEORGE LEWIN.
Professor at the Fr. Wilh. University, and Surgeon-in-Chief of the Syphilitic Wards and Skin Disease Wards of the Charité Hospital, Berlin.

THE TREATMENT OF SYPHILIS WITH SUBCUTANEOUS SUBLIMATE INJECTIONS. Translated by DR. CARL PRÆGLE, and DR. E. H. GALE, late Surgeon United States Army. Small 8vo, 7s.

LEWIS'S PRACTICAL SERIES.

Under this title Mr. LEWIS purposes publishing a complete Series of Monographs, embracing the various branches of Medicine and Surgery.

The volumes, written by well-known Hospital Physicians and Surgeons recognized as authorities in the subjects of which they treat, are in active preparation. The works are intended to be of a THOROUGHLY PRACTICAL nature, calculated to meet the requirements of the general practitioner, and to present the most recent information in a compact and readable form; the volumes will be handsomely got up, and issued at low prices, varying with the size of the works.

BODILY DEFORMITIES AND THEIR TREATMENT: A HANDBOOK OF PRACTICAL ORTHOPÆDICS. By H. A. REEVES, F.R.C.S. Edin., Senior Assistant Surgeon and Teacher of Practical Surgery at the London Hospital; Surgeon to the Royal Orthopædic Hospital, &c. With numerous Illustrations, cr. 8vo, 8s. 6d. [Now ready.]

DENTAL SURGERY FOR GENERAL PRACTITIONERS AND STUDENTS OF MEDICINE. By ASHLEY W. BARRETT, M.B. Lond., M.R.C.S., L.D.S., Dental Surgeon, to, and Lecturer on Dental Surgery and Pathology in the Medical School of, the London Hospital. With Illustrations, cr. 8vo, 3s. [Now ready.]

Further volumes will be announced in due course.

* * Prospectus of the Series with specimen pages, &c., on application.

LEWIS'S POCKET MEDICAL VOCABULARY.

[In the Press.]

J. S. LOMBARD, M.D.

Formerly Assistant Professor of Physiology in Harvard College.

I.
EXPERIMENTAL RESEARCHES ON THE REGIONAL TEMPERATURE OF THE HEAD, under Conditions of Rest, Intellectual Activity and Emotion. With Illustrations, 8vo, 8s.

II.
ON THE NORMAL TEMPERATURE OF THE HEAD. 8vo, 5s.

WILLIAM THOMPSON LUSK, A.M., M.D.

Professor of Obstetrics and Diseases of Women in the Bellevue Hospital Medical College, &c.

THE SCIENCE AND ART OF MIDWIFERY. Second Edition, with numerous Illustrations, 8vo, 18s.

JOHN MACPHERSON, M.D.

Inspector-General of Hospitals H.M. Bengal Army (Retired).

Author of "Cholera in its Home," &c.

ANNALS OF CHOLERA FROM THE EARLIEST PERIODS TO THE YEAR 1817. With a map. Demy 8vo, 7s. 6d.

DR. V. MAGNAN.

Physician to St. Ann Asylum, Paris; Laureate of the Institute.

ON ALCOHOLISM, the Various Forms of Alcoholic Delirium and their Treatment. Translated by W. S. GREENFIELD, M.D., M.R.C.P. 8vo, 7s. 6d.

A. COWLEY MALLEY, B.A., M.B., B.CH. T.C.D.

PHOTO-MICROGRAPHY; including a description of the Wet Collodion and Gelatino-Bromide Processes, together with the best methods of Mounting and Preparing Microscopic Objects for Photo-Micrography. Second Edition, with Photographs and Illustrations, crown 8vo, 7s. 6d. [Now ready.]

PATRICK MANSON, M.D., C.M.
Amoy, China.

THE FILARIA SANGUINIS HOMINIS; AND CERTAIN NEW FORMS OF PARASITIC DISEASE IN INDIA, CHINA, AND WARM COUNTRIES. Illustrated with Plates and Charts. 8vo, 10s. 6d.

PROFESSOR MARTIN.

MARTIN'S ATLAS OF OBSTETRICS AND GYNÆCOLOGY. Edited by A. MARTIN, Docent in the University of Berlin. Translated and edited with additions by FANOURT BARNES, M.D., M.R.C.P., Physician to the Chelsea Hospital for Women; Obstetric Physician to the Great Northern Hospital; and to the Royal Maternity Charity of London, &c. Medium 4to, Morocco half bound, 3rs. 6d. net.

WILLIAM MARTINDALE, F.C.S.
Late Examiner of the Pharmaceutical Society, and late Teacher of Pharmacy and Demonstrator of Materia Medica at University College.

AND

W. WYNN WESTCOTT, M.B. LOND.
Deputy Coroner for Central Middlesex.

THE EXTRA PHARMACOPŒIA of Unofficial Drugs and Chemical and Pharmaceutical Preparations, with References to their Use abstracted from the Medical Journals and a Therapeutic Index of Diseases and Symptoms. Third Edition, revised with numerous additions, limp roan, med. 24mo, 7s. [Now ready.]

J. F. MEIGS, M.D.
Consulting Physician to the Children's Hospital, Philadelphia.

AND

W. PEPPER, M.D.
Lecturer on Clinical Medicine in the University of Pennsylvania.

A PRACTICAL TREATISE ON THE DISEASES OF CHILDREN. Seventh Edition, revised and enlarged, roy. 8vo, 28s.

Wm. JULIUS MICKLE, M.D., M.R.C.P. LOND.
Member of the Medico-Psychological Association of Great Britain and Ireland; Member of the Clinical Society, London; Medical Superintendent, Grove Hall Asylum, London.

GENERAL PARALYSIS OF THE INSANE. 8vo, 10s.

KENNETH W. MILLICAN, B.A. CANTAB., M.R.C.S.

THE EVOLUTION OF MORBID GERMS: A Contribution to Transcendental Pathology. Cr. 8vo, 3s. 6d.

E. A. MORSHEAD, M.R.C.S., L.R.C.P.

Assistant to the Professor of Medicine in University College, London.

TABLES OF THE PHYSIOLOGICAL ACTION OF DRUGS. Fcap. 8vo, 1s.

A. STANFORD MORTON, M.B., F.R.C.S. ED.

Senior Assistant Surgeon, Royal South London Ophthalmic Hospital.

REFRACTION OF THE EYE: Its Diagnosis, and the Correction of its Errors, with Chapter on Keratoscopy. Second edit., with Illustrations, small 8vo, 2s. 6d.

WILLIAM MURRELL, M.D., F.R.C.P.

Lecturer on Materia Medica and Therapeutics at Westminster Hospital; Examiner in Materia Medica, University of Edinburgh.

WHAT TO DO IN CASES OF POISONING. Fourth Edition, revised and enlarged, royal 32mo, 3s. 6d.

NITRO-GLYCERINE AS A REMEDY FOR ANGINA PECTORIS. Crown 8vo, 3s. 6d.

WILLIAM NEWMAN, M.D. LOND., F.R.C.S.

Surgeon to the Stamford Infirmary.

SURGICAL CASES: Mainly from the Wards of the Stamford, Rutland, and General Infirmary, 8vo, paper boards, 4s. 6d.

DR. FELIX von NIEMEYER.

Late Professor of Pathology and Therapeutics; Director of the Medical Clinic of the University of Tübingen.

A TEXT-BOOK OF PRACTICAL MEDICINE, WITH PARTICULAR REFERENCE TO PHYSIOLOGY AND PATHOLOGICAL ANATOMY. Translated from the Eighth German Edition, by special permission of the Author, by GEORGE H. HUMPHREY, M.D., and CHARLES E. HACKLEY, M.D., Revised Edition, 2 vols., large 8vo, 36s.

C. F. OLDHAM, M.R.C.S., L.R.C.P.

Surgeon H.M. Indian Forces; late in Medical charge of the Dalhousie Sanitarium.

WHAT IS MALARIA? and why is it most intense in hot climates? An explanation of the Nature and Cause of the so-called Marsh Poison, with the Principles to be observed for the Preservation of Health in Tropical Climates and Malarious Districts. Demy 8vo, 7s. 6d.

G. OLIVER, M.D., M.R.C.P.

THE HARROGATE WATERS: ^{I.} Data Chemical and Therapeutical, with notes on the Climate of Harrogate. Addressed to the Medical Profession. Crown 8vo, with Map of the Wells, 3s. 6d.

ON BEDSIDE URINE TESTING: ^{II.} including Quantitative Albumen and Sugar. Third edition, revised and enlarged, fcap. 8vo. [In the press.]

JOHN S. PARRY, M.D.

Obstetrician to the Philadelphia Hospital, Vice-President of the Obstetrical and Pathological Societies of Philadelphia, &c.

EXTRA-UTERINE PREGNANCY; Its Causes, Species, Pathological Anatomy, Clinical History, Diagnosis, Prognosis and Treatment. 8vo, 8s.

E. RANDOLPH PEASLEE, M.D., LL.D.

Late Professor of Gynecology in the Medical Department of Dartmouth College; President of the New York Academy of Medicine, &c., &c.

OVARIAN TUMOURS: Their Pathology, Diagnosis, and Treatment, especially by Ovariectomy. Illustrations, roy. 8vo, 16s.

G. V. POORE, M.D., F.R.C.P.

Professor of Medical Jurisprudence, University College; Assistant Physician to, and Physician in charge of the Throat Department of University College Hospital.

LECTURES ON THE PHYSICAL EXAMINATION OF THE MOUTH AND THROAT. With an Appendix of Cases. 8vo, 3s. 6d.

R. DOUGLAS POWELL, M.D., F.R.C.P., M.R.C.S.

Physician to the Middlesex Hospital, and Physician to the Hospital for Consumption and Diseases of the Chest at Brompton.

DISEASES OF THE LUNGS AND PLEURÆ. Third Edition, rewritten and enlarged. With Illustrations, 8vo.

[In the press.]

AMBROSE L. RANNEY, A.M., M.D.
Adjunct Professor of Anatomy in the University of New York, etc.

THE APPLIED ANATOMY OF THE NERVOUS SYSTEM, being a study of this portion of the Human Body from a standpoint of its general interest and practical utility, designed for use as a Text-book and a Work of Reference. With 179 Illustrations, 8vo, 20s.

H. A. REEVES, F.R.C.S. ED.

*Senior Assistant Surgeon and Teacher of Practical Surgery at the London Hospital;
 Surgeon to the Royal Orthopædic Hospital, &c.*

BODILY DEFORMITIES AND THEIR TREATMENT:
 A Handbook of Practical Orthopædics. With numerous Illustrations, crown 8vo, 8s. 6d. [Now ready.
Lewis's Practical Series].

RALPH RICHARDSON, M.A., M.D.

Fellow of the College of Physicians, Edinburgh.

ON THE NATURE OF LIFE: An Introductory Chapter to Pathology. Second Edition, revised and enlarged. Fcap. 4to, 10s. 6d.

W. RICHARDSON, M.A., M.D., M.R.C.P.

REMARKS ON DIABETES, ESPECIALLY IN REFERENCE TO TREATMENT. Demy 8vo, 4s. 6d.

SYDNEY RINGER, M.D.

Professor of the Principles and Practice of Medicine in University College; Physician to, and Professor of Clinical Medicine in, University College Hospital.

I.
A HANDBOOK OF THERAPEUTICS. Tenth Edition, 8vo, 15s.

II.
ON THE TEMPERATURE OF THE BODY AS A MEANS OF DIAGNOSIS AND PROGNOSIS IN PHTHISIS. Second Edition, small 8vo, 2s. 6d.

FREDERICK T. ROBERTS, M.D., B.SC., F.R.C.P.

Examiner in Medicine at the Royal College of Surgeons; Professor of Therapeutics in University College; Physician to University College Hospital; Physician to Brompton Consumption Hospital, &c.

I.
A HANDBOOK OF THE THEORY AND PRACTICE OF MEDICINE. Fifth Edition, with Illustrations, in one volume, large 8vo, 21s.

II.
NOTES ON MATERIA MEDICA AND PHARMACY. Fcap. 8vo, 7s. 6d. [Now ready.]

D. B. St. JOHN ROOSA, M.A., M.D.

Professor of Diseases of the Eye and Ear in the University of the City of New York; Surgeon to the Manhattan Eye and Ear Hospital; Consulting Surgeon to the Brooklyn Eye and Ear Hospital, &c., &c.

A PRACTICAL TREATISE ON THE DISEASES OF THE EAR, including the Anatomy of the Organ. Sixth Edition, Illustrated by wood engravings and chromo-lithographs, large 8vo. [Just ready.

J. BURDON SANDERSON, M.D., LL.D., F.R.S.

Jodrell Professor of Physiology in University College, London.

UNIVERSITY COLLEGE COURSE OF PRACTICAL EXERCISES IN PHYSIOLOGY. With the co-operation of F. J. M. PAGE, B.Sc., F.C.S.; W. NORTH, B.A., F.C.S., and AUG. WALLER, M.D. Demy 8vo, 3s. 6d.

W. H. O. SANKEY, M.D. LOND., F.R.C.P.

Late Lecturer on Mental Diseases, University College and School of Medicine for Women, London; Formerly Medical Superintendent (Female Department) of Hanwell Asylum; President of Medico-Psychological Society, &c.

LECTURES ON MENTAL DISEASE. Second Edition, with coloured plates, 8vo, 12s. 6d. [Now ready.

ALDER SMITH, M.B. LOND., F.R.C.S.

Resident Medical Officer, Christ's Hospital, London.

RINGWORM: Its Diagnosis and Treatment.

Third Edition, rewritten and enlarged. With Illustrations, fcap. 8vo. [In the press.

J. LEWIS SMITH, M.D.

Physician to the New York Infants' Hospital; Clinical Lecturer on Diseases of Children in Bellevue Hospital Medical College.

A TREATISE ON THE DISEASES OF INFANCY AND CHILDHOOD. Fifth Edition, with Illustrations, large 8vo, 21s.

FRANCIS W. SMITH, M.B., B.S.

THE LEAMINGTON WATERS; CHEMICALLY, THERAPEUTICALLY AND CLINICALLY CONSIDERED; with observations on the climate of Leamington. With Illustrations, crown 8vo, 2s. 6d.

JAMES STARTIN, M.B., M.R.C.S.

Surgeon and Joint Lecturer to St. John's Hospital for Diseases of the Skin.

LECTURES ON THE PARASITIC DISEASES OF THE SKIN. VEGETOID AND ANIMAL. With Illustrations, Crown 8vo, 3s. 6d.

HENRY R. SWANZY, A.M., M.B., F.R.C.S.I.

Examiner in Ophthalmic Surgery, University of Dublin; Surgeon to the National Eye and Ear Infirmary, Dublin; Ophthalmic Surgeon at the Adelaide Hospital, Dublin.

HANDBOOK OF DISEASES OF THE EYE AND THEIR TREATMENT. Illustrated with wood-engravings, colour tests, etc., large post 8vo, 10s. 6d. [Now ready.

LEWIS A. STIMSON, B.A., M.D.

Surgeon to the Presbyterian Hospital; Professor of Pathological Anatomy in the Medical Faculty of the University of the City of New York.

A MANUAL OF OPERATIVE SURGERY. With three hundred and thirty-two Illustrations. Post 8vo, 10s. 6d.

HUGH OWEN THOMAS, M.R.C.S.

I.

DISEASES OF THE HIP, KNEE, AND ANKLE JOINTS, with their Deformities, treated by a new and efficient method. With an Introduction by RUSHTON PARKER, F.R.C.S., Lecturer on Surgery at the School of Medicine, Liverpool. Second Edition, 8vo, 25s.

II.

CONTRIBUTIONS TO MEDICINE AND SURGERY:—

- PART I.—Intestinal Obstruction; with an Appendix on the Action of Remedies. 10s.
 „ 2.—The Principles of the Treatment of Joint Disease, Inflammation, Anchylosis, Reduction of Joint Deformity, Bone Setting. 5s.
 „ 5.—On Fractures of the Lower Jaw. 1s.
 „ 8.—The Inhibition of Nerves by Drugs. Proof that Inhibitory Nerve-Fibres do not exist. 1s.

(Parts 3, 4, 6, 7, 9, 10, are expected shortly).

J. ASHBURTON THOMPSON, M.R.C.S.

Late Surgeon at King's Cross to the Great Northern Railway Company.

FREE PHOSPHORUS IN MEDICINE WITH SPECIAL REFERENCE TO ITS USE IN NEURALGIA. A contribution to Materia Medica and Therapeutics. An account of the History, Pharmaceutical Preparations, Dose, Internal Administration, and Therapeutic uses of Phosphorus; with a Complete Bibliography of this subject, referring to nearly 200 works upon it. Demy 8vo, 7s. 6d.

J. C. THOROWGOOD, M.D.

Assistant Physician to the City of London Hospital for Diseases of the Chest.

THE CLIMATIC TREATMENT OF CONSUMPTION AND CHRONIC LUNG DISEASES. Third Edition, post 8vo, 3s 6d.

EDWARD T. TIBBITS, M.D. LOND.

Physician to the Bradford Infirmary; and to the Bradford Fever Hospital.

MEDICAL FASHIONS IN THE NINETEENTH CENTURY, including a Sketch of Bacterio-Mania and the Battle of the Bacilli. Crown 8vo, 2s. 6d.

LAURENCE TURNBULL, M.D., PH.G.

Aural Surgeon to Jefferson Medical College Hospital, &c., &c.

ARTIFICIAL ANÆSTHESIA: A Manual of Anæsthetic Agents, and their Employment in the Treatment of Disease. Second Edition, with Illustrations, crown 8vo, 6s.

W. H. VAN BUREN, M.D., LL.D.
Professor of Surgery in the Bellevue Hospital Medical College.

DISEASES OF THE RECTUM: And the Surgery of the Lower Bowel. Second Edition, with Illustrations, 8vo, 14s.

RUDOLPH VIRCHOW, M.D.
Professor in the University, and Member of the Academy of Sciences of Berlin, &c., &c.

INFECTION - DISEASES IN THE ARMY, Chiefly Wound Fever, Typhoid, Dysentery, and Diphtheria. Translated from the German by JOHN JAMES, M.B., F.R.C.S. Fcap. 8vo, 1s. 6d.

ALFRED VOGEL, M.D.
Professor of Clinical Medicine in the University of Dorpat, Russia.

A PRACTICAL TREATISE ON THE DISEASES OF CHILDREN. Translated and Edited by H. RAPHAEL, M.D. From the Fourth German Edition, illustrated by six lithographic plates, part coloured, large 8vo, 18s.

A. DUNBAR WALKER, M.D., C.M.
THE PARENT'S MEDICAL NOTE BOOK. Oblong post 8vo, cloth, 1s. 6d.

W. SPENCER WATSON, F.R.C.S. ENG., B.M. LOND.
Surgeon to the Great Northern Hospital; Surgeon to the Royal South London Ophthalmic Hospital.

I.
DISEASES OF THE NOSE AND ITS ACCESSORY CAVITIES. Profusely Illustrated. Demy 8vo, 18s.

II.
EYEBALL-TENSION: Its Effects on the Sight and its Treatment. With woodcuts, p. 8vo, 2s. 6d.

III.
ON ABSCESS AND TUMOURS OF THE ORBIT. Post 8vo, 2s. 6d.

A. DE WATTEVILLE, M.A., M.D., B.Sc., M.R.C.S.
Physician in Charge of the Electro-therapeutical Department at St. Mary's Hospital.

A PRACTICAL INTRODUCTION TO MEDICAL ELECTRICITY. Second Edition, re-written and enlarged, copiously illustrated, 8vo, 9s. [*Just published.*]

FRANCIS H. WELCH, F.R.C.S.
Surgeon Major, A.M.D.

ENTERIC FEVER: as Illustrated by Army Data at Home and Abroad, its Prevalence and Modifications, Ætiology, Pathology and Treatment. 8vo, 5s. 6d. [*Just published.*]

DR. F. WINCKEL.
Formerly Professor and Director of the Gynecological Clinic at the University of Rostock.
THE PATHOLOGY AND TREATMENT OF CHILD-BED: A Treatise for Physicians and Students. Translated from the Second German edition, with many additional notes by the Author, by J. R. CHADWICK, M.D., 8vo, 14s.

EDWARD WOAKES, M.D. LOND.

Senior Aural Surgeon and Lecturer on Aural Surgery at the London Hospital; Senior Surgeon to the Hospital for Diseases of the Throat.

ON DEAFNESS, GIDDINESS AND NOISES IN THE HEAD.

VOL. I.—POST-NASAL CATARRH, AND DISEASES OF THE NOSE CAUSING DEAFNESS. With Illustrations, cr. 8vo, 6s. 6d.

VOL. II.—ON DEAFNESS, GIDDINESS AND NOISES IN THE HEAD. Third Edition, with Illustrations, cr. 8vo. [*In preparation.*]

E. T. WILSON, B.M. OXON., F.R.C.P. LOND.

Physician to the Cheltenham General Hospital and Dispensary.

DISINFECTANTS AND HOW TO USE THEM. In
Packets of one doz. price 1s.

Clinical Charts for Temperature Observations, etc.

Arranged by W. RIGDEN, M.R.C.S. 7s. per 100, or 1s. per dozen.

Each Chart is arranged for four weeks, and is ruled at the back for making notes of cases; they are convenient in size, and are suitable both for hospital and private practice.

PERIODICAL WORKS PUBLISHED BY H. K. LEWIS.

THE NEW SYDENHAM SOCIETY'S PUBLICATIONS. Annual Subscription, One Guinea.

(Report of the Society, with Complete List of Works and other information, gratis on application.)

ARCHIVES OF PEDIATRICS. A Monthly Journal, devoted to the Diseases of Infants and Children. Annual Subscription, 12s. 6d., post free.

THE NEW YORK MEDICAL JOURNAL. A Weekly Review of Medicine. Annual Subscription, One Guinea, post free.

THE THERAPEUTIC GAZETTE. A Monthly Journal, devoted to the Science of Pharmacology, and to the introduction of New Therapeutic Agents. Edited by Drs. H. C. Wood and R. M. Smith. Annual Subscription, 10s., post free.

MEDICAL BULLETIN. A Monthly Journal of Medicine and Surgery. Edited by Dr. J. V. Shoemaker. Annual Subscription, 5s.

THE GLASGOW MEDICAL JOURNAL. Published Monthly. Annual Subscription, 20s., post free. Single numbers, 2s. each.

LIVERPOOL MEDICO-CHIRURGICAL JOURNAL, including the Proceedings of the Liverpool Medical Institution. Published twice yearly, 3s. 6d. each.

THE INDIAN MEDICAL JOURNAL. A Journal of Medical and Sanitary Science specially devoted to the Interests of the Medical Services. Annual Subscription, 24s., post free.

THE MIDLAND MEDICAL MISCELLANY AND PROVINCIAL MEDICAL JOURNAL. Annual Subscription, 7s. 6d., post free.

TRANSACTIONS OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA. Volumes I to VI., now ready, 8vo, 10s. 6d. each.

* * Mr. LEWIS has transactions with the leading publishing firms in America for the sale of his publications in that country. Arrangements are made in the interests of Authors either for sending a number of copies of their works to the United States, or having them reprinted there, as may be most advantageous.

Mr. Lewis's publications can be procured of any bookseller in any part of the world.



